Theses and Dissertations | 1. Thesis and Dissertation Collection, all items

2020-03

THE ANALYTICS QUOTIENT: RETOOLING CIVIL AFFAIRS FOR THE FUTURE OPERATING ENVIRONMENT

Tunning, Christopher W.

Monterey, CA; Naval Postgraduate School

NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

THE ANALYTICS QUOTIENT: RETOOLING CIVIL AFFAIRS FOR THE FUTURE OPERATING ENVIRONMENT

by

Christopher W. Tunning

March 2020

Thesis Advisor: Timothy C. Warren
Second Reader: Ryan Maness

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE			*Form Approved OMB* *No. 0704-0188*
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.			
1. AGENCY USE ONLY *(Leave blank)*	**2. REPORT DATE** March 2020	**3. REPORT TYPE AND DATES COVERED** Master's thesis	
4. TITLE AND SUBTITLE THE ANALYTICS QUOTIENT: RETOOLING CIVIL AFFAIRS FOR THE FUTURE OPERATING ENVIRONMENT			**5. FUNDING NUMBERS**
6. AUTHOR(S) Christopher W. Tunning			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			**8. PERFORMING ORGANIZATION REPORT NUMBER**
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			**10. SPONSORING / MONITORING AGENCY REPORT NUMBER**
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release. Distribution is unlimited.			**12b. DISTRIBUTION CODE** A
13. ABSTRACT (maximum 200 words) Historically, military intelligence analysts and U.S. forces, frozen in their preferred strategy of attrition warfare, have undervalued civil information in conflicts against irregular threats. As operating environments grow more complex, uncertain, and population-centric, the roles of Civil Affairs Forces and civil information will become increasingly relevant. Unfortunately, the current analytical methods prescribed in Civil Affairs doctrine are inadequate for evaluating complex environments. They fail to provide supported commanders with the information required to make informed decisions. The purpose of this research is to determine how Civil Affairs Forces must retool their analytical capabilities to meet the demands of future operating environments. The answer lies in developing an organic Civil Affairs analytic capability suitable for employing data-driven approaches to gain actionable insights into uncertain operational environments, and subsequently, integrating those insights into sophisticated operational targeting frameworks and strategies designed to disrupt irregular threats. This research uses case studies of organizations, across a range of industries, that leveraged innovative data-driven approaches into disruptive competitive advantages. These organizations highlight the broad utility of the prescribed approaches and potential pathways for Civil Affairs Forces to pursue in creating an analytic capability that supports effective civil knowledge integration.			
14. SUBJECT TERMS civil affairs, civil-military operations, irregular warfare, intelligence analysis, data science, open source data analysis, social network analysis, organizational change, organizational design, civil information management, civil knowledge integration, strategy			**15. NUMBER OF PAGES** 205
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	**18. SECURITY CLASSIFICATION OF THIS PAGE** Unclassified	**19. SECURITY CLASSIFICATION OF ABSTRACT** Unclassified	**20. LIMITATION OF ABSTRACT** UU

THIS PAGE INTENTIONALLY LEFT BLANK

THE ANALYTICS QUOTIENT: RETOOLING CIVIL AFFAIRS FOR THE FUTURE OPERATING ENVIRONMENT

Christopher W. Tunning
Major, United States Army
BBA, Georgia College, 2005

Submitted in partial fulfillment of the
requirements for the degree of

**MASTER OF SCIENCE IN DEFENSE ANALYSIS
(IRREGULAR WARFARE)**

from the

**NAVAL POSTGRADUATE SCHOOL
March 2020**

Approved by: Timothy C. Warren
Advisor

Ryan Maness
Second Reader

Kalev I. Sepp
Chair, Department of Defense Analysis

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

Historically, military intelligence analysts and U.S. forces, frozen in their preferred strategy of attrition warfare, have undervalued civil information in conflicts against irregular threats. As operating environments grow more complex, uncertain, and population-centric, the roles of Civil Affairs Forces and civil information will become increasingly relevant. Unfortunately, the current analytical methods prescribed in Civil Affairs doctrine are inadequate for evaluating complex environments. They fail to provide supported commanders with the information required to make informed decisions. The purpose of this research is to determine how Civil Affairs Forces must retool their analytical capabilities to meet the demands of future operating environments. The answer lies in developing an organic Civil Affairs analytic capability suitable for employing data-driven approaches to gain actionable insights into uncertain operational environments, and subsequently, integrating those insights into sophisticated operational targeting frameworks and strategies designed to disrupt irregular threats. This research uses case studies of organizations, across a range of industries, that leveraged innovative data-driven approaches into disruptive competitive advantages. These organizations highlight the broad utility of the prescribed approaches and potential pathways for Civil Affairs Forces to pursue in creating an analytic capability that supports effective civil knowledge integration.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF FIGURES

LIST OF TABLES

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF ACRONYMS AND ABBREVIATIONS

ASCOPE	areas, structures, capabilities, organizations, people, events
CA	civil affairs
CAA	civil affairs activities
CAO	civil affairs operations
CE	civil engagement
CIM	civil information management
CKI	civil knowledge integration
CMSE	civil-military support element
CME	civil military engagement
COG	center of gravity
COP	common operating picture
CR	civil reconnaissance
EBM	evidence-based medicine
ECG	electrocardiogram
ED	emergency department
FMA	force modernization assessment
FNA	functional needs assessment
FOE	future operational environment
HA	humanitarian assistance
HAMO	human aspects of military operations
ICEWS	intelligence, cyber, electronic warfare, signal
IGO	intergovernmental organization
IPI	indigenous populations and institutions
IW	irregular warfare
JIPOE	joint intelligence preparation of the environment
KLE	key leader engagement
LA	link analysis
MDO	multi-domain operations
MDTF	multi-domain task force
METT-TC	mission, enemy, troops, terrain, time, civil considerations

MLB	Major League Baseball
NGO	nongovernmental organization
JOPP	joint operations planning process
MDMP	military decision-making process
NATO	North Atlantic Treaty Organization
NYPD	New York Police Department
OAA	operations, actions, and activities
OE	operational environment
PMESII-PT	political, military, economic, social, informational, infrastructure, physical environment, time
RCT	randomized controlled trial
SNA	social network analysis
SOF	special operations forces
TCAPF	tactical conflict assessment and planning framework
TRADOC	U.S. Army Training and Doctrine Command
TSOC	Theater Special Operations Command
USAID	United States Agency for International Development
USSOCOM	United States Special Operations Command
USG	United States government

ACKNOWLEDGMENTS

THIS PAGE INTENTIONALLY LEFT BLANK

I.   INTRODUCTION

As the former U.S. Army Chief of Staff General Mark Milley explains in his foreword to *The U.S. Army in Multi-Domain Operations 2028*, the character of warfare is rapidly changing.[1] He notes that America's strategic competitors are combining emerging technologies with their study of military doctrine and operations. He argues that the U.S. Army must evolve to retain its ability to compete and, if necessary, defeat strategic competitors such as Russia and China in future conflicts. Milley's point, combined with the central idea of the multi-domain operations (MDO), implies that there is no winning in the future operating environment, only a return to competition. The U.S. Army's Training and Doctrine Command (TRADOC) writes:

> Army forces, as an element of the Joint Force, conduct Multi-Domain Operations to prevail in competition; when necessary, Army forces penetrate and dis-integrate enemy anti-access and area denial systems and exploit the resultant freedom of maneuver to achieve strategic objectives (win) and force a return to competition on favorable terms.[2]

This outlook serves as the impetus for this research. Milley asserts that U.S. forces must find ways to compete under the threshold of armed conflict, a role typically assumed by organizations within the interagency, interorganizational, and multinational institutions.[3] This assertion has profound implications about the future role of the U.S. Army as a component of the Joint Force. In other words, the envisioned transformation will require radically different authorities and formations to achieve America's political-military objectives. Also, Milley's perspective on the disruptive role emerging technologies will play in the competition and conflict phases cannot be overstated. There is no shortage of examples demonstrating the disruptive effects of fusing emerging technologies and innovative methodologies on the battlefield. With these points in mind, this research

---

[1] Mark A. Milley, "Foreword," in *The U.S. Army in Multi-Domain Operations 2028*, TRADOC Pamphlet 525-3-1 (Fort Eustis, VA: United States Army Training and Doctrine Command, 2018), i.

[2] United States Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, TRADOC Pamphlet 525-3-1 (Fort Eustis, VA: United States Army Training and Doctrine Command, 2018), vii.

[3] Milley, "Foreword," i.

evaluates the future operating environment, the role that Civil Affairs Forces (CA) will assume in support of the Army and Joint Force, and the utility of using technology-enabled data science.

This thesis research seeks to broaden Milley's vision of the future in one crucial aspect. It argues that modest investments and changes in personnel, education, technology, and organizational structures will improve the performance of U.S. forces in the competition phase. These new considerations would occur beneath the threshold of armed conflict, nested under the *Joint Concepts of Integrated Campaigning* (JCIC), *Operating in the Information Environment* (JCOIE) and *Human Aspects of Military Operations* (HAMO).[4] These investments and changes in force structure emphasize the need for a calibrated force posture and maximization of human potential outlined in the MDO concept.[5] These two elements would leverage existing authorities and programs of record, particularly U.S. Special Operations Command's (USSOCOM) *Civil-Military Engagement* (CME), to maximize the utility of persistent engagement elements while supporting them with a robust analytical capability.[6] The combination of the persistent engagement elements armed with a potent analytical capability designed to reduce the complexity of future operating environments will improve the performance of the U.S. Army and Joint Force against irregular threats. This proposal supports the most important aspect of the MDO concept, the acknowledgment that the central purpose of irregular threats is to

---

[4] Office of the Joint Chiefs of Staff, *Joint Operating Concept for Integrated Campaigning* (Washington, DC: Office of the Joint Chiefs of Staff, 2018), https://www.jcs.mil/Portals/36/Documents/ Doctrine/concepts/joint_concept_integrated_campaign.pdf?ver=2018-03-28-102833-257; Office of the Joint Chiefs of Staff, *Joint Concept for Operating in the Information Environment (JCOIE)* (Washington, DC: Office of the Joint Chiefs of Staff, 2018), https://jdeis.js.mil/jdeis/jel/concepts/jcoie.pdf; Office of the Joint Chiefs of Staff, *Joint Concept for Human Aspects of Military Operations (JC-HAMO)* (Washington, DC: Office of the Joint Chiefs of Staff, 2016), https://jdeis.js.mil/jdeis/jel/concepts/ human_aspects_military_ops.pdf.

[5] United States Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, iii, x.

[6] Department of the Army, *Civil Military Engagement*, Army Techniques Publication 3-57.80 (Washington, DC: Headquarters, Department of the Army, 2013), https://armypubs.army.mil/ProductMaps/ PubForm/Details.aspx?PUB_ID=103796.

perpetuate an infinite game and exhaust finite players.[7] Civil affairs operations (CAO) in support of CME, like all Special Operations Forces (SOF), offer a low-cost, economy-of-force solution for the U.S. Army to be an infinite player in an infinite game. Dealing with irregular threats in the competition phase under the threshold of armed conflict should support and enhance the Army's operational concept of convergence in armed conflict in multiple domains.[8]

General Townsend's tone in the preface of *The U.S. Army in Multi-Domain Operations 2028* is equally ominous, noting that America's adversaries exploit political and economic domains to achieve their strategic political-military objectives under the threshold of armed conflict.[9] Townsend believes these strategic approaches risk what he describes as, "the strategic depth that gives our Joint Force its operational advantage and enables our offensive military capability."[10] Townsend identifies a four-point transformation plan to mitigate the threats posed by U.S. adversaries, yet two are fundamental to this research. Townsend writes:

- Drive rapid, non-linear solutions in Army doctrine, organization, training, material, leadership and education, personnel, facilities, and policy;
- Deepen the operational integration of general purpose and special operations forces and with our allies and partners.[11]

These two pathways provide the guidance and direction needed to compete in other domains and support the concept of an expanded role for SOF CA forces supporting CME missions with U.S. allies and partners in future operating environments. There is a clear

---

[7] Simon Sinek, "The Infinite Game" (Lecture, The New York Times Conferences, New York, NY, May 31, 2018), https://www.youtube.com/watch?v=tye525dkfi8.

[8] The U.S. Army's MDO concept defines convergence as "the rapid and continuous integration of capabilities in all domains, the EMS, and the information environment that optimizes effects to overmatch the enemy through cross-domain synergy and multiple forms of attack all enabled by mission command and disciplined initiative." United States Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, iii, 20.

[9] Stephen J. Townsend, "Preface," in *The U.S. Army in Multi-Domain Operations 2028*, TRADOC Pamphlet 525-3-1 (Fort Eustis, VA: United States Army Training and Doctrine Command, 2018), iii.

[10] Townsend, iii.

[11] Townsend, iii.

need for a robust analytic capability focused on the civil domain to build a contextual, intuitive understanding of the operational environment, particularly across the informational, social, and political domains.

One of the central findings of the research presented here is that the U.S. underperforms against irregular threats because U.S. forces and their interagency partners lack a contextual understanding of their operational environment. For instance, Zachary Shore illustrates this point beautifully in the initial pages of his book *A Sense of the Enemy*.[12] He describes the inability of U.S officials to identify the second-in-command of the Taliban over three separate rounds of peace talks despite what he describes as, "a decade of military operations across Afghanistan."[13] This failure resulted in an imposter swindling U.S. officials out of an undisclosed sum of money and what Shore asserts as, "[an] exposure of how poorly the United States knew its enemy in this ongoing war."[14] As the threats to U.S. national security become more complex (composed of irregular, networked, resilient threats and centers of gravity remaining population-centric), U.S. forces will require additional ways to generate insights into future operational environments to reduce their complexity. Traditional methods have proven inconclusive and inadequate.[15] With the Army's MDO concept requiring effective civil knowledge integration, other methods and analytical techniques must be adapted or developed to meet the demands of the future operating environment.[16] Fortunately, the fields of data science and social science offer solutions to improve U.S. forces' understanding of their

---

[12] Zachary Shore, *A Sense of the Enemy: The High-Stakes History of Reading Your Rival's Mind* (New York, NY: Oxford University Press, 2014), 1.

[13] Shore, 1.

[14] Shore, 1.

[15] David Galula, *Counterinsurgency Warfare: Theory and Practice* (Westport, CT: Praeger Security International, 2006), 4; United States Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, 6, 8.

[16] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond* (Fort Bragg, NC: U.S. Army Special Operations Center of Excellence, 2018), 7.

operational environment in the same way they impacted other markets, industries, and professions in the recent past.[17]

A.   RESEARCH QUESTION

How should the Civil Affairs Branch retool its analytical capabilities to meet the demands of the future operating environment?

B.   PROBLEM STATEMENT

Civil Affairs (CA) forces lack the analytical capabilities necessary to provide their supported military commanders and political leadership with the quality and type of information they require to make informed decisions. The types of analytical methods prescribed in the current CA doctrine are inadequate and require significant changes to meet the demands of uncertain operational environments. As adversaries and competitors adopt strategies designed to add complexity and uncertainty into operating environments (OE), CA forces must adapt and implement innovative analytical methodologies to inform operational and strategic approaches to disrupt, deter, and defeat competitors and adversaries in future operating environments.

C.   PURPOSE STATEMENT

This research aims to determine the best approach to adopting strategic analytical capabilities within the Civil Affairs Branch. The strategic analysis capability must incorporate valid data analysis methodologies and data science approaches for structuring and visualizing data to reduce the complexity of the operational environment. It should possess the capability of modeling the operational environment, and use the insights derived from these analyses to inform operational and strategic approaches in a prescriptive and predictive manner.

---

[17] Michael Lewis, *Moneyball: The Art of Winning an Unfair Game*, Kindle (New York, NY: W. W. Norton & Company, 2003); Michael Lewis, *The Undoing Project: A Friendship That Changed Our Minds* (New York, NY: W. W. Norton & Company, 2017), 16.

D. THESIS STATEMENT

To compete in future operating environments, the Civil Affairs Branch must develop an organic, data-driven analytic capability featuring the application of data science, social network analysis, statistical modeling and analysis techniques, hypothesis testing, and counterfactuals to improve the performance of U.S. Forces against irregular threats.

E. RESEARCH DESIGN

This research uses case studies of organizations, across a range of professions, to show the broad applicability and utility of adopting data-driven and evidence-based approaches as a means to gain insights into uncertain environments. Whether they represent markets, medical diagnoses and protocols, or predicting criminal activity, each profession represented in the following cases shares challenges similar to those normally associated with intelligence analysis. This thesis explores the analysis of the civil component, known as civil information management or civil knowledge integration, which is a component of intelligence analysis. The parallels are easily drawn in the cases of policing and business, as these professions incorporate a similar function of predictive quality. For example, predicting the time and location of criminal activity follows a similar logic model as predicting the actions of your adversaries on the battlefield. The lesser-known relationship lies in the medical parallels, yet Rebecca Fisher et al. illuminate the similarities in their chapter of *Analyzing Intelligence* titled "Is Intelligence Analysis a Discipline?" writing:

> The medical community's parallel to intelligence analysis may be more apt owing to the temporal nature—often urgency—with which members of each group must confront difficult challenges of decision making in life-or-death and high-risk situations. Reliance upon years of training, individual experience, and consultation with colleagues has prevailed for centuries in medical decision making—an "apprenticeship" learning model of the highest order–forming a pattern of expertise and finding support for one's

decisions that is remarkably similar to what goes on in the intelligence community.[18]

Thus, the situations faced by medical professionals and methods for developing expertise share a substantial resemblance to the environmental challenges and process of developing intelligence analysts within the intelligence community.

1.   Case Selection Criteria

All case selections meet the following criteria:

- Each case evaluates organizations operating in dynamic environments defined by uncertainty and complexity.[19]

- Each case evaluates organizations where human intuition and experience were the dominant analytical methods of understanding their environment. Decisions based on this analysis determined how the organization allocates its limited resources.

- Each organization adopted a data-driven approach that disrupted and rapidly improved areas of concern throughout its respective industry.

- In each case, the adopted analytic techniques yielded insights that challenged the conventional wisdom within their profession.[20] These insights changed the organizations' understanding of their environment and were subsequently used to develop more effective operational and strategic approaches.

---

[18] Rebecca Fisher, Rob Johnston, and Peter Clement, "Is Intelligence Analysis a Discipline?," in *Analyzing Intelligence: National Security Practitioners' Perspectives*, Second edition (Washington, DC: Georgetown University Press, 2014), 60.

[19] Some critics might argue that Major League Baseball does not constitute a dynamic environment; however, actors within the business, such as the General Managers and Owners, would disagree on the basis that each multimillion-dollar contract and draft pick represents a sizable investment from the organization. The complexity and uncertainty lie in assessing the potential performance of individual players, which would be similar to predicting the times and locations of criminal activity, or efficacy of medical interventions or protocols.

[20] The conventional wisdom was the product of expert judgment based on extensive experience.

This research uses multiple secondary sources per case study, and each case study is drawn from individuals who directly participated in the event in reports or recorded interviews with media outlets. Additional sources include leading experts that assessed the lasting impact of these transitions, including Nobel Peace Prize-winning psychologists, military strategists, economists, statisticians, social scientists, peer-reviewed journals, government reports, and several books from academic presses. Sources specific to the Civil Affairs community come from both published and working documents within the Civil Affairs Proponent.

2.   Data

This research uses multiple secondary sources per case study, and each case study is drawn from individuals who directly participated in the event in reports or recorded interviews with media outlets. Additional sources include leading experts who assessed the lasting impact of these transitions, including Nobel Peace Prize-winning psychologists, military strategists, economists, statisticians, social scientists, peer-reviewed journals, government reports, and several books from academic presses. Sources specific to the Civil Affairs community come from both published and working documents within the Civil Affairs Proponent.

3.   Analytic Approach

This thesis begins with a review of relevant literature, which is necessary to form the basis of the research and demonstrate its application to the current problem facing the U.S. Army and Joint Force in future operating environments. The literature review is followed by a presentation of case studies that evaluate the utility of adopting data-driven approaches in environments similar to those associated with confronting irregular threats in future operating environments, focusing specifically on the civil knowledge integration required to support such an activity. These cases represent instances where organizations and enterprising leaders innovated or adopted new methods of critically analyzing their environments. The cases are followed by an analysis of the U.S. Army's past efforts at analyzing the civil component in conflicts against irregular threats. This analysis is followed by a review of the current methods U.S. forces use to generate insights into the

civil component of their operational environment and subsequent integration of those insights into institutional Army and joint planning processes. The methodology and recommended analytical techniques set the foundation for the next section which investigates the potential applications of underutilized methodologies, techniques, and frameworks useful in developing a contextual understanding of future operating environments. These methodologies, techniques, and frameworks operate using different assumptions and provide a more sophisticated approach in operational targeting and strategy development against irregular threats. Lastly, this research closes with recommendations and conclusions related to reducing the gap between the actual and desired analytical capabilities within the CA community and how this analytical capability can improve the operational and strategic performance of the U.S. Army and Joint Force.

THIS PAGE INTENTIONALLY LEFT BLANK

II. LITERATURE REVIEW

In the body of military literature, there is a distinct lack of emphasis in two areas, analysis of the civil component and intelligence analysis. A majority of the literature is either classified or resides in doctrinal publications that outline analytical roles, methodologies, processes, techniques, and outputs. These processes are typically rigid and explained broadly enough to facilitate staff planning processes. In this respect, the Civil Affairs (CA) Branch in the United States Army is no different. The sparse literature that exists comes from CA doctrine, policy, and practitioners of Civil Information Management (CIM). Since the U.S. Army Training and Doctrine Command (TRADOC) published *The U.S. Army in Multi-Domain Operations 2028*, the literature regarding the emerging role of CA in the future operating environment and their desired analytical capabilities increased significantly in publications such as *The Small Wars Journal*, *War on the Rocks*, and Modern Warfare Institute. The consensus among authors is that the current CA forces and doctrine are inadequate to support competition in hybrid environments against near-peer threats.[21] This realization alludes to the analytical immaturity of Civil Affairs Branch within the U.S. Army. This acknowledgment is important because it concludes that warfare has changed in character and complexity and Civil Affairs Branch must develop an analytical capability to meet the demands of more complex, turbulent, and challenging future operating environments.

While the U.S. Army excels in attrition warfare, its near-peer competitors employ strategies deliberately designed to secure their policy objectives under the threshold of

---

[21] Jay Liddick, Thurman Scott Dickerson, and Linda K. Chung, "Calibrating Civil Affairs Forces for Lethality in Large Scale Combat Operations," *Small Wars Journal*, accessed November 4, 2019, https://smallwarsjournal.com/jrnl/art/calibrating-civil-affairs-forces-lethality-large-scale-combat-operations; U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*; Nicholas Krohley, "Moving Beyond the Post-9/11 Manhunt: Translating Tactical Wins into Strategic Success," Modern War Institute, February 6, 2019, https://mwi.usma.edu/moving-beyond-post-9-11-manhunt-translating-tactical-wins-strategic-success/.

armed conflict.[22] Russia's *fait accompli* seizure of Crimea in 2014 and subsequent operations to secure the Donbass region of Ukraine demonstrated to the United States and its North Atlantic Treaty Organization (NATO) allies the effectiveness of these strategies and threats posed by Russian irregular warfare capabilities.[23] Opting not to pursue the development and replication of U.S. technological advantages, Russia developed technologies and capabilities designed to deny U.S. and NATO technological advantages while simultaneously dominating the information and cyber domains, using them to wage political warfare and undermine Western institutions.[24]

In response to the escalation of Russian and Chinese activities, the U.S. Army published two strategic documents focused on its role in the future operating environment. *The Army Operating Concept: Winning in a Complex World* (AOC) and *The U.S. Army in Multi-Domain Operations 2028* (MDO) define the U.S. Army's theory of victory and outline the requirements and capabilities necessary for its forces to defeat near-peer threats across the range of military operations.[25] These documents acknowledge that the nature of warfare has changed and, consequently, the U.S. Army needs to develop capabilities and doctrine capable of detecting, deterring, disrupting, and defeating hybrid threats. Consequently, the U.S. Army's Civil Affairs Proponent, the entity responsible for developing policy and doctrine, published *Civil Affairs: 2025 and Beyond* that outlined an emerging civil affairs operating concept consistent with the requirements specified in the

---

[22] Qiao Liang and Wang Xiangsui, *Unrestricted Warfare* (Beijing: PLA Literature and Arts Publishing House, 1999); Sean McFate, *The New Rules of War: Victory in the Age of Durable Disorder* (New York, NY: Harper Collins Publishers, 2019); Valery Gerasimov, "The Value of Science Is in the Foresight: New Challenges Demand Rethinking the Forms and Methods of Carrying out Combat Operations," *Military Review* 96, no. 1 (February 2016): 24–29.

[23] United States Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, 1–15.

[24] Gerasimov, "The Value of Science Is in the Foresight," 29.

[25] United States Army Training and Doctrine Command, *The Army Operating Concept 2014: Win in a Complex World*, TRADOC Pamphlet 525-3-1 (Fort Eustis, VA: Department of the Army, 2014); United States Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*; U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*, 1–19.

AOC, MDO, and multiple joint operating concepts.[26] This document is relevant because it describes the future role, capabilities, and organizational design of CA forces, specifically its desired analytical capabilities to support the new CA operating concept.

With these changes in mind, CA leaders started publishing articles to shape the strategic position of the Civil Affairs Branch and identify areas where the branch needed to improve. The body of literature consistently identifies CA doctrine as one critical area in need of improvement.[27] Liddick et al., Krohley, and Yager argue that doctrine is insufficient to develop an analytical capability within CA forces. Liddick et al. acknowledged the capability shortfall while simultaneously clarifying that "many CA units provide varying levels of analysis to fulfill operational requirements."[28] It is an acknowledgment that while there is significant room for improvement, the current level of analytical support is sufficient to support both conventional and special operations. They also suggest that one contributing factor preventing CA forces from developing adequate doctrine is the disregard with which conventional forces approach the civil component during exercises.[29] While frustrating, limiting, and counterproductive, conventional units are not responsible for CA's inadequate analytical capability and doctrine.

While Nicholas Krohley shares a similar perspective on the inadequacy of CA doctrine, he disagrees with Liddick et al.'s argument that CA is providing adequate analytical support to its supported commanders. He describes many of the methods recommended in CA targeting methodology doctrine as irrelevant. He argues that "The 'fill in the blanks' approach to our ASCOPE and PMESII frameworks drives a closed,

---

[26] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*.

[27] Liddick, Dickerson, and Chung, "Calibrating Civil Affairs Forces for Lethality"; Eric Yager, "Setting the Civil Affairs Analytical Foundation," LinkedIn, May 11, 2018, https://www.linkedin.com/pulse/setting-civil-affairs-analytical-foundation-eric-yager-pmp/; Nicholas Krohley, "Integrating Civil Affairs – An Outsider's View," Civil Affairs Association, September 18, 2019, https://www.civilaffairsassoc.org/single-post/2019/09/18/Integrating-Civil-Affairs-%E2%80%93-An-Outsider%E2%80%99s-View.

[28] Liddick, Dickerson, and Chung, "Calibrating Civil Affairs Forces for Lethality."

[29] Liddick, Dickerson, and Chung.

reductive intellectual process that is ill suited to delivering granular, actionable insights."[30] Krohley believes that CA is missing the point of their activity, which he identifies as the mandate to deliver "actionable insights" into "an integrated targeting process." This structure is aimed at providing a comprehensive understanding of the operational environment, enabling the disruption of the socio-political structures connecting the insurgency and the local populations supporting it.[31] Lastly, Krohley contends that the current process creates "a dangerously incomplete and ultimately misleading view of our enemies. Networks like the Islamic State, al-Qaeda, and the Taliban do not float, cloud-like, above the terrain. They cannot be understood as something distinct from the societies in which they operate."[32] Krohley's observations offer keen insights into how to improve the process without recommending how to generate those insights, yet he provides process improvements and relevant areas of focus to improve U.S. forces' understanding of the operating environment with relevant outputs.

Where Krohley provides macro criticisms of CA doctrine, Yager provides more specific criticism of the content and processes recommended in *Field Manual 3-57: Civil Affairs Operations* and *Army Techniques Publication 3–57.50: Civil Affairs Civil Information Management*.[33] He argues from his extensive experience with the Civil Affairs Branch, Civil Information Management, and as an accomplished data scientist. In describing the recommended analytical techniques suggested within the doctrine, Yager remarks, "Data science encompasses so much more than these 17 pages embody and, as such, the actual application of data analytics to CA operations is either never done or is relegated to CA practitioners who previously studied data analytics."[34] He adds further,

---

[30] Krohley, "Moving Beyond the Post-9/11 Manhunt."

[31] Krohley.

[32] Krohley.

[33] Yager, "Setting the Civil Affairs Analytical Foundation"; Department of the Army, *Civil Affairs Operations*, Field Manual 3-57 (Washington, DC: Department of the Army, 2019); Department of the Army, *Civil Affairs Civil Information Management*, Army Techniques Publication 3-57.50 (Washington, DC: Headquarters, Department of the Army, 2013), https://armypubs.army.mil/ProductMaps/PubForm/Details.aspx?PUB_ID=103622.

[34] Yager.

FM 3-57's definition of analysis presents CIM analysis loosely as descriptive analytics in that it defines how to visualize data without defining a method to analyze or a way to predict future trends. Some of the methods discussed include link diagrams, nodal diagrams, PMESII-PT/ASCOPE charts, stability matrix, activities matrix, geospatial depictions, and map overlays. All these tools are used to depict information, but none of them to garner a conclusion.[35]

These are important distinctions because most CA forces responsible for conducting CIM understand they possess valuable information, but they lack the means to analyze it effectively, a sentiment captured in the "CA 2025: The Strategic Design of Civil Affairs."[36] In essence, the current doctrine emphasizes the process of creating products without providing the means to conduct analysis. This emphasis also explains why critical stakeholders in the conventional forces and intelligence communities undervalue of CA outputs.[37]

The lack of data analysis techniques within CA doctrine is the one reason why civil information is underprioritized and undervalued within the intelligence community. Flynn et al. provide evidence to support this argument in the opening of their work *Fixing Intel: A Blueprint for Making Intelligence Relevant in Afghanistan* observing,

Based on discussions with hundreds of people inside and outside the intelligence community, it recommends sweeping changes to the way the intelligence community thinks about itself—from a focus on the enemy to a focus on the people of Afghanistan. The paper argues that because the United States has focused the overwhelming majority of collection efforts and analytical brainpower on insurgent groups, our intelligence apparatus still finds itself unable to answer fundamental questions about the environment in which we operate and the people we are trying to protect and persuade.[38]

---

[35] Yager.

[36] Samuel L. Hayes Jr. and Ken Nguyen, "CA 2025: The Strategic Design of Civil Affairs" (Capstone, Monterey, CA, Naval Postgraduate School, 2015), 52–57, http://hdl.handle.net/10945/45870.

[37] Krohley, "Moving Beyond the Post-9/11 Manhunt"; Michael T. Flynn, Matt Pottinger, and Paul D. Batchelor, *Fixing Intel: A Blueprint for Making Intelligence Relevant in Afghanistan* (Washington, DC: Center for a New American Security, 2010), 7.

[38] Flynn, Pottinger, and Batchelor, *Fixing Intel*, 4.

Flynn et al.'s powerful statement and affirmation of the intelligence community's focus on threat groups blinded them to the broader socio-political aspects of their operating environment. Among the sweeping changes listed in the document was the directive to prioritize more civil information.[39] They argue, "This vast and underappreciated body of information, almost all of which is unclassified, admittedly offers few clues about where to find insurgents, but it does provide elements of even greater strategic importance – a map for leveraging populist support and marginalizing the insurgency itself."[40] Flynn et al.'s analysis and recommendations underscore two points that clearly illustrate why the intelligence community undervalued the civil aspects of their operating environment.

The first point is that U.S. forces decided to fight the insurgents and not the broader insurgency, which violates key positions argued by Nagl and Galula, prominent strategists in counterinsurgency operations. Nagl argues:

> Conventional military forces are too prone to emphasize offensive actions such as capturing or killing terrorists rather than the predominantly political, economic, and security requirements upon which the intelligence available from civilians to sophisticated weapons systems to create targeted killing campaigns against insurgent leadership. This approach offers only false hope; for every insurgent captured or killed another one (or often several) will appear–so long as they are enabled by passive civilians and a moribund government presence. To win, the government must secure and control the local population.[41]

This fact reveals the strategic misalignment of priorities, focus, and effort between U.S. forces and their stated strategy, which leads to an illuminating question. If there exists no pathway to victory in Afghanistan using "lethal targeting alone," then why are the vast majority of intelligence analysts and assets dedicated to analyzing threat groups?[42]

---

[39] Flynn, Pottinger, and Batchelor, 4.

[40] Flynn, Pottinger, and Batchelor, 7.

[41] John A. Nagl, "Foreword," in *Counterinsurgency Warfare: Theory and Practice* (Westport, CT: Praeger Security International, 2006), vii.

[42] Flynn, Pottinger, and Batchelor, *Fixing Intel*, 4,7.

16

Blanken and Overbaugh answer this question in their refute to Flynn et al.'s paper.[43] They claim the overall design, function, and purpose of military intelligence is to evaluate and assess threats to the force using a deductive argument. They argue that the military intelligence units and analysts are a product of an organization designed to function in a specific type of environment (a machine bureaucracy) which they liken to "complex mass production facilities, such as an automobile plant."[44] One characteristic of these environments is a prioritization of standardization of process over a requirement for specialized education and training. They argue that the purpose of military analysts at higher echelons is to filter and verify intelligence in support of their political leadership. While Flynn et al. blame the intelligence community for the dysfunction and lack of relevance, Blanken and Overbaugh place the responsibility with the political leadership's failure to clearly define their political end states and policy objectives. Thus, in the absence of guidance, the intelligence community and military defaulted to their intended purpose and core competencies, doubling down on their network-centric targeting approaches to dismantle threat networks, defying the narrative that "we cannot kill our way to victory."[45] However, pursuing solely kinetic approaches has thus far not proved a sound strategy for defeating insurgencies.[46]

The second point Flynn et al.'s analysis highlights is that the preferred U.S. military strategy of attrition and the organizational design of its intelligence units are optimized to defeat conventional armies, not insurgencies and hybrid threats.[47] The combination of these two factors led analysts to focus on threat groups and ignore civil information

---

[43] Leo Blanken and Justin Overbaugh, "Looking for Intel?... Or Looking for Answers? Reforming Military Intelligence for a Counterinsurgency Environment," *Intelligence and National Security* 27, no. 4 (July 27, 2012): 559–75, https://doi.org/10.1080/02684527.2012.688307.

[44] Blanken and Overbaugh, 564.

[45] Flynn, Pottinger, and Batchelor, *Fixing Intel*, 8; Krohley, "Moving Beyond the Post-9/11 Manhunt."

[46] McFate, The New Rules of War, 94–96.

[47] Blanken and Overbaugh, "Looking for Intel?," 563–66; Hy S. Rothstein, "Civil-Military Relations and Assessments," in *Assessing War: The Challenge of Measuring Success and Failure*, ed. Leo J. Blanken and Jason J. Lepore (Washington, DC: Georgetown University Press, 2015), 22.

perceived as less relevant. To solve this problem, Flynn et al. recommended that analysts should focus on capturing data from sources including "civil affairs officers, PRTs, atmospherics teams, Afghan liaison officers, female engagement teams, willing non-governmental organizations and development organizations, United Nations officials, psychological operations teams, [and] human terrain teams" to obtain the information necessary to analyze and assess their operational environment.[48] These recommendations would be more consistent with the stated strategy of counterinsurgency operations and ways to progress towards aligning U.S. political goals and operational benchmarks noted as the Clausewitzian gap, or the theoretical space between political policy goals and military objectives.[49] Nevertheless, Flynn et al. confirm the underutilization of CA's civil information, critical to the success in countering both insurgencies and hybrid threats that effectively use the civil component for cover and concealment.[50] In dedicating the majority of analytical resources towards insurgent groups, the military intelligence apparatus left a blind spot in their understanding of the operational environment: the linkages between insurgents and local social-political structures.[51]

Flynn et al. confirm this blind spot in their observation that the intelligence community could not answer fundamental questions about their operating environment:

> Ignorant of local economics and landowners, hazy about who the powerbrokers are and how they might be influenced, incurious about the correlations between various development projects and the levels of cooperation among villagers, and disengaged from people in the best position to find answers—whether aid workers or Afghan soldiers—U.S. intelligence officers and analysts can do little but shrug in response to high level decision-makers seeking the knowledge, analysis, and information they need to wage a successful counterinsurgency.[52]

---

[48] Flynn, Pottinger, and Batchelor, *Fixing Intel*, 4.

[49] Leo J. Blanken and Jason J. Lepore, "Principals, Agents, and Assessment," in *Assessing War: The Challenge of Measuring Success and Failure* (Washington, DC: Georgetown University Press, 2015), 6.

[50] Liddick, Dickerson, and Chung, "Calibrating Civil Affairs Forces for Lethality"; U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*, 6.

[51] Krohley, "Moving Beyond the Post-9/11 Manhunt."

[52] Flynn, Pottinger, and Batchelor, *Fixing Intel*, 7.

Despite CA reports describing these atmospherics and other relevant information, Flynn et al.'s characterization of the military intelligence effectiveness against the insurgency in Afghanistan is reminiscent of warnings present in David Galula's *Counterinsurgency Warfare: Theory and Practice*.[53] In the "Foreword," John A. Nagl argues that "modifying organizations, training, and equipment of conventional forces, critical as it is, is insufficient to satisfy the demands of counterinsurgency operations."[54] Essentially, the blind spot is an indicator that the Joint Force and its military intelligence apparatus has not adapted well to counterinsurgency operations or has not applied the principles outlined in Galula's book. However, Galula's influence is noted in the Army's MDO operating concept and accompanying *Civil Affairs: 2025 and Beyond*, which explains CA's operating concept in support of MDO.

As near-peer hybrid capabilities increasingly pose a greater threat than insurgencies, the *Civil Affairs: 2025 and Beyond* emphasizes the need for additional analytical capabilities to support the Army's MDO concept by detecting and defeating near-peer hybrid capabilities within future operational environments. Critical to the success of this operational view is its concept of Civil Knowledge Integration (CKI), nested under the *Joint Operating Concept of Human Aspects of Military Operations* (HAMO).[55] CKI proposes future CA forces must focus on the "collection, fusion, analysis, evaluation, and integration of civil knowledge to inform commanders' situational understanding and decision making."[56] Further, the Civil Affairs Proponent argues that future CA forces must do two things. First, it contends that an "expanded practice of civil information management (CIM) applies civil expertise and predictive analysis to evaluate, model, and anticipate human geography, which includes the decision making of relevant actors."[57] Second, it proposes the core of the future Civil Affairs Branch capabilities require the following capabilities:

---

[53] Flynn, Pottinger, and Batchelor, *Fixing Intel*; Galula, *Counterinsurgency Warfare*.

[54] Nagl, "Foreword," x.

[55] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs*, 8.

[56] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, 8.

[57] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, 8.

Future CA elements integrate emerging technologies while conducting CR in MDO in the civil component of traditional domains, and across the spectrum of social media and the breadth of the information environment. CA forces must combine social science, advanced analytical practices, and technology platforms to interpret civil information from complex datasets; identify networks, patterns, and critical information; and project changing conditions in human geography. Examples of technology-enabled social analysis include predictive analysis, relational database management, spatial analysis, data mining, link analysis, content analysis, and sentiment analysis. Future CA technologies must be able to input and output in formats that are compatible with the Army's Common Operating Environment (COE) and Command Post Computing Environment (CPCE).[58]

These requirements greatly exceed current CA analytical capabilities and will require significant investments in human capital to achieve.

Past efforts aimed at expanding CA analytical capabilities proved ineffective, resulting in a rebranding of current capabilities and an overselling of its analytical capabilities. Hayes and Nguyen capture this sentiment in their Naval Postgraduate School capstone project titled "CA 2025: The Strategic Redesign of Civil Affairs" when participants described their leadership's overselling of analytical capabilities as undermining CA's strategic position within the force.[59] Where tools such as Palantir and Combined Information Data Network Exchange (CIDNE) added a descriptive geospatial, temporal, and relational capability by combining elements of other intelligence analysis software such as ArcGIS and Analyst Notebook (ANB), they failed to deliver a more sophisticated analytical capability as these systems provide a synthesis of the same analytical methods. While there is a utility in these systems enabling CA personnel to perform their established analytical methods and techniques more efficiently and effectively, they fail to provide insights beyond these established methods. In essence, CA Forces utilized these programs, originally designed to meet the needs of intelligence professionals, to suit their purpose and populate their civil reconnaissance and civil engagement reporting. Even the open-source data analysts at Protected Information

---

[58] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, 8–9.

[59] Hayes and Nguyen, "CA 2025," 55–57, 98.

Exchange (PiX) develop products in the PMESII-PT/ASCOPE format at the request of Civil Affairs and Psychological Operations forces.[60] The result is inventing more ways to do the same thing, reinforcing the methods that Krohley argues leaves the common operating picture of the operational environment "dangerously incomplete."[61] Therefore, new methods must be developed and adopted to gain further insights into the operational environment. Fortunately, there is literature that recommends methods and techniques that analysts can leverage to obtain these insights and integrate them into both strategy and operations.

In his foundational work *Networks and Netwar* with David Ronfeldt, John Arquilla argues social network analysis (SNA) is a useful tool for generating innovative insights and facilitating an understanding of irregular threats such as transnational criminal organizations, organizations whose structures resemble "networks rather than the more traditional hierarchical structures."[62] He is far from alone in this argument. The consensus among experts such as Sean Everton, Daniel Cunningham, Nancy Roberts, Valdis E. Krebs, and Stuart Koschade agree with Arquilla's assertion.[63] While Everton and Roberts voiced some reservations about using SNA for lethal targeting, they offer useful guidance on using SNA to develop strategies for disrupting and defeating irregular threats in their article "Strategies for Combating Dark Networks." They illustrate, "how social network analysis can be a useful tool to flesh out the strategic options within both the kinetic and

---

[60] Protected Information Exchange, "Requests for Information," Protected Information Exchange (PiX), accessed October 31, 2019, https://www.pixtoday.net/rfi/rfi?desc=true&page=0&search=PMESII&sort=createdDateTime.

[61] Krohley, "Integrating Civil Affairs."

[62] John Arquilla and David F. Ronfeldt, *Networks and Netwars the Future of Terror, Crime, and Militancy* (Santa Monica, CA: RAND Corporation, 2001), 79.

[63] Valdis Krebs, "Mapping Networks of Terrorist Cells," *Connections* 24, no. 3 (2002): 43–52; Sean F. Everton, *Disrupting Dark Networks* (New York, NY: Cambridge University Press, 2012); Stuart Koschade, "A Social Network Analysis of Jemaah Islamiyah: The Applications to Counterterrorism and Intelligence," *Studies in Conflict & Terrorism*, no. 29 (2006): 559–75, https://doi.org/10.1080/10576100600798418; Daniel Cunningham, Philip Murphy, and Sean Everton, *Understanding Dark Networks: A Strategic Framework for the Use of Social Network Analysis* (Lanham, MD: Rowman & Littlefield, 2016).

non-kinetic approaches."[64] Yet, the benefits offered by SNA are not limited to the analysis of adversarial organizational structures. Arquilla argues the applications of SNA also extend to the analysis of friendly networks serving dual purposes.[65] David Krackhardt agrees with Arquilla's assertion, as his works focus on the efficiency of organizational structures and the identification of experts within informal networks.[66] These experts make a compelling argument for using SNA in a myriad of ways to support intelligence and organizational analysis activities, yet SNA is conspicuously absent from the literature and working documents within the CA literature as a required capability, suggesting it is no longer being considered as a potential analytical tool.[67] The absence is conspicuous because the *Civil-Military Engagement* program specifically lists network analysis and network engagement as a task for Civil Military Support Elements (CMSE) operating under these specific authorities.[68] Despite these omissions, many within the CA community understand the utility and potential applications of SNA through their exposure to its techniques and metrics while attending Naval Postgraduate School and many CA students in the Defense Analysis program have employed these techniques in their thesis research and capstone projects.[69]

Among the other tools listed by the CA Proponent in their *Civil Affairs: 2025 and Beyond* is the requirement for CA forces to "combine social science, advanced analytic practices, and technology platforms to interpret civil information from complex datasets,"

---

[64] Sean F. Everton and Nancy Roberts, "Strategies for Combating Dark Networks," *Journal of Social Structure* 12 (2011): 3.

[65] Arquilla and Ronfeldt, *Networks and Netwars*, 347–69.

[66] David Krackhardt and Jeffrey R. Hanson, "Informal Networks: The Company Behind the Chart," *Harvard Business Review* 71, no. 4 (1993): 104–11; Kathleen M. Carley, Ju-Sung-Lee, and David Krackhardt, "Destabilizing Networks," *Connections* 24, no. 3 (2002): 79–92.

[67] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, "Civil Affairs Force Modernization Assessment" (Civil Affairs Modernization Assessment, Fort Bragg, NC, October 21, 2019); Liddick, Dickerson, and Chung, "Calibrating Civil Affairs Forces for Lethality"; U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*.

[68] Department of the Army, *Civil Affairs Operations*, paras. 2–111.

[69] Hayes and Nguyen, "CA 2025"; Daniel K. Chaves, David Christmas, and Tammy L. Sloulin, "Humanitarian Assistance Organizations and their Role in Crisis Response on the Korean Peninsula" (Monterey, CA, Naval Postgraduate School, 2018), Calhoun, http://hdl.handle.net/10945/61329.

which is not defined in CA doctrine or JCIM Manuals in any meaningful sense.[70] Thus, the CA Proponent outlined a desire to develop a data science capability to supplement its limited analysis capabilities that are not mentioned anywhere in Army or Joint doctrine. Vasant Dhar describes data science is a rapidly growing interdisciplinary field that combines mathematics, statistics, computer science, and information science.[71] He suggests it uses elements of these disciplines to extract knowledge and insights from both structured and unstructured data using a variety of statistical applications, algorithms, and systems. Eric Yager, a veteran Civil Affairs Officer, analyst, and Business Analytics M.S. candidate, attacks civil affairs doctrine in his article "Setting the Civil Affairs Analytical Foundation" arguing the analysis described in CA doctrine are "tools used to depict information, but none of them garner a conclusion."[72] He emphasizes the need for data science techniques in Civil Affairs analysis to transition the analysis from descriptive to predictive. He recommends structuring datasets, using social network analysis, and regression analysis to determine the relationships between the events in both temporal and relational terms to determine the social network potential.

The addition of data science capabilities would resolve some of the issues outlined in the *Joint Civil Information Management User's Manual 2.0* such as "no interoperable systems for storing and transmitting civil information" and improve the "standardization of collecting, consolidating, and sharing civil information."[73] Data science is widely used throughout the financial, marketing, medical, technology, and analysis industries and maintains broad potential applications for analyzing the civil component of future operating environments. There is sufficient evidence to support the concept of integrating data science into CA analysis capabilities. The United States Agency for International

---

[70] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*, 8.

[71] Vasant Dhar, "Data Science and Prediction," *Communications of the ACM* 56, no. 12 (December 2013): 64–73, https://doi.org/10.1145/2500499.

[72] Yager, "Setting the Civil Affairs Analytical Foundation."

[73] United States Special Operations Command, *Joint Civil Information Management User's Manual 2.0*, 2.0 (Tampa, FL: Headquarters, United States Special Operations Command, 2011), iii, https://publicintelligence.net/ussocom-cim-handbook/.

Development (USAID) and Central Intelligence Agency (CIA) both incorporated data science into their organizational capabilities with USAID establishing a data repository named the Foreign Aid Explorer (FAE) and CIA establishing its Directorate of Digital Innovation in 2015.[74]

The last area nearly absent from military literature is Social Movement Theory (SMT). There are several concepts nested under SMT such as social identity theory (SIT) that have profound applications for the future operating environment, particularly in the political, social, and informational domains. The current SMT model outlined in both Gemma Edwards's book *Social Movements and Protests* and Doowan Lee's article "A Social Movement Approach to Unconventional Warfare" provide an excellent framework to understand the socio-political dynamics behind social movements.[75] The key assumption that all violent extremist organizations are social movements engaging in political violence opens pathways for new knowledge.[76] Doowan Lee offered U.S. policymakers and special operations forces responsible for conducting unconventional warfare a new operational approach with the potential for more durable political outcomes. He uses the social movement theory model as a means to articulate the interrelationships between a social movement's structural strains, which he describes as broad socio-economic processes. Organizational resources and networks are described as organizational strength or political opportunities, and narratives associated with cultural framing can be articulated as strategic framing.[77]

---

[74] United States Agency for International Development Data Services, "USAID Foreign Aid Explorer - About," accessed June 1, 2019, https://explorer.usaid.gov/about; Sean Lyngaas, "Inside the CIA's New Digital Directorate," FCW: The Business of Federal Technology, October 1, 2015, https://fcw.com/articles/2015/10/01/cia-digital-directorate.aspx; Suzanne Kelly, "The CIA's Officer of the Future," The Cipher Brief, May 28, 2017, https://www.thecipherbrief.com/column_article/best-of-the-cias-officer-of-the-future-2.

[75] Gemma Edwards, *Social Movements and Protest* (New York, NY: Cambridge University Press, 2014); Doowan Lee, "A Social Movement Approach to Unconventional Warfare," *Special Warfare* 26, no. 3 (2013): 27–33.

[76] Edwards, *Social Movements and Protest*, 151–212.

[77] Lee, "A Social Movement Approach to Unconventional Warfare," 29.

Although consistent with Clausewitz's notion that "war is the continuation of politics by other means," the common consensus among experts was that violent groups represented a different population and, therefore, should be categorized differently.[78] Marc Sageman's work *Misunderstanding Terrorism* offers a contrasting opinion based on social identity theory that provides additional insights into motivations behind political violence. He argues groups and actors engaging in political violence do so because their perceived collective identity is threatened, which triggers a martial identity.[79] The implications of using social identity theory are profound. Other SMT and SIT theories such as group polarization and social polarization are also useful in understanding the operational environment.[80] A RAND study titled *Lessons from Russia's Operations in Crimea and Eastern Ukraine* attributes Russia's failures to coerce further concessions from Ukraine to Russia's underestimation of the Ukrainian national identity.[81] Consequently, the consensus among policy experts, strategists, and social scientists state that there is a utility in leveraging these components of SMT to develop operational approaches and strategies to cultivate resiliencies against and resistance to irregular threats using the insights derived from SMT and SIT theories and frameworks.[82]

Many of these concepts are not widely understood among military audiences because they are largely absent from both military and international relations literature primarily concerned with improving the lethality of its military forces. SNA, SMT, and data science techniques are not applied in CA's analysis of the civil component, which

---

[78] Edwards, *Social Movements and Protest*, 151–212; Carl Von Clausewitz, *On War*, ed. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1989), 605.

[79] Marc Sageman, *Misunderstanding Terrorism* (University of Pennsylvania Press, 2017), 115.

[80] Cass R. Sunstein, "The Law of Group Polarization," *Journal of Political Philosophy* 10, no. 2 (2002): 175–95, https://doi.org/10.1111/1467-9760.00148; Lilliana Mason, *Uncivil Agreement: How Politics Became Our Identity*, Kindle (Chicago: University of Chicago Press, 2018).

[81] Michael Kofman et al., *Lessons from Russia's Operations in Crimea and Eastern Ukraine* (Santa Monica, CA: RAND Corporation, 2017).

[82] Lee, "A Social Movement Approach to Unconventional Warfare"; Sageman, *Misunderstanding Terrorism*; Sunstein, "The Law of Group Polarization"; Mason, *Uncivil Agreement*; P.W. Singer and Emerson T. Brooking, *LikeWar: The Weaponization of Social Media*, Kindle (Boston: Houghton Mifflin Harcourt, 2018); Kofman et al., *Russia's Operations in Crimea*.

leaves significant gaps in the U.S. Army and Joint Forces' understanding of the operational environment. Therefore, this research is necessary to support the CA Proponent's concepts of CKI and the MDO concept of competing with near-peer threats under the threshold of armed conflict in future operating environments. Civil Affairs' propensity to outsource its analysis to military intelligence analysts and overreliance on information systems to perpetuate the same reductivist CIM processes needs to be re-examined and rethought.[83] Intelligence and targeting processes designed specifically to target threat networks will consistently lead to an undervaluing of the civil information needed to emerge from armed conflict and return to competition on favorable terms.[84] The methods prescribed in doctrine lack the analytical potency and validity required to generate new insights that build an intuitive, contextual understanding of the operational environment.[85] In light of this evidence, the CA Branch must adopt innovative analytical tools, techniques, and frameworks to meet expectations of their emerging role in support of the Army and Joint Force.

---

[83] Flynn, Pottinger, and Batchelor, *Fixing Intel*, 1–7; U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*, 8; Krohley, "Moving Beyond the Post-9/11 Manhunt"; Department of the Army, *Civil Affairs Operations*, 1–7; Hatteras A. Hoops, *Information & Knowledge Management White-Paper: DTRA/JIDO CDI Observations & Recommendations*, White Paper (Stuttgart, Germany: SOCAFRICA, 2017).

[84] United States Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, 17.

[85] Krohley, "Moving Beyond the Post-9/11 Manhunt"; Yager, "Setting the Civil Affairs Analytical Foundation."

III. CASE STUDIES

The following case studies outline the disruptive effects of innovative data-driven approaches to markets and industries. Each instance provides a different lesson about how data driven approaches have helped disadvantaged organizations solve problems yielding either a competitive advantage or a way to invest resources more efficiently. Each scenario can serve as a model for the U.S. military for developing and processing insights from the operational environment and securing favorable outcomes against irregular threats.

A. MONEYBALL—MODELING MAJOR LEAGUE BASEBALL

> Billy: If we try to play like the Yankees in here, we will lose to the Yankees out there.
>
> Grady: Boy, that sounds like fortune cookie wisdom to me Billy.
>
> Billy: No, that's just logic.
>
> — *Moneyball*[86]

1. Background

In the late 1990s and early 2000s, discussions occurred within Major League Baseball (MLB) of rich teams subsidizing poor teams to increase their competitiveness. From the MLB Commissioner Alan H. Selig's perspective, MLB's "two poorest teams such as the Oakland A's and Tampa Bay Devil Rays" could not compete with teams like the New York Yankees with budgets two-to-three times their size.[87] To prove Selig wrong, Billy Beane, with the support of the Oakland A's Front Office, invested in an innovative idea of applying statistical modeling and analysis to obtain new baseball knowledge and build a competitive baseball team even with a severely restricted budget.

---

[86] Bennett Miller, *Moneyball* (Sony Pictures, 2011).

[87] Lewis, *Moneyball*, 120.

2.   Problem

The principal problem facing Billy Beane and the Oakland A's was how to compete with other MLB organizations with budgets three times their own. The Oakland A's were losing their best players because their contracts were expiring and the team could no longer afford to retain them. Other teams, like the New York Yankees and Boston Red Sox with budgets in excess of $120 million, were able to draft, trade, and retain the players of their choice with little fiscal consideration. The secondary issue was the uncertainty associated with player selection. Each player contract was a risky investment with little certainty of how that player would develop and perform. As Nate Silver describes in his book *The Signal and the Noise:*

> The demand to know what the future holds for different types of baseball players—whether couched in terms of scouting reports or statistical systems like PECOTA—still greatly exceeds supply. Millions of dollars—and the outcome of the World Series—are at stake each time a team decides which player to draft, whom to trade for, how much they should pay for a free agent.[88]

Thus, the stakes are equally high for all the teams, as each team invested millions of dollars into players with no certainty of their future performance.

3.   Innovation

Beane and his special assistant, Paul DePodesta, used statistical modeling and data analytics to develop insights into the game of baseball. They found hidden knowledge from their willingness to experiment and refusal to submit to the common attributional biases rooted in the game such as player size, appearance, mechanics, and personality. They discovered player traits that other teams undervalued and then exploited the market of talent, purchasing players with those traits at a discounted rate. Lewis added further:

> Many of the players drafted or acquired by the Oakland A's had been the victims of an unthinking prejudice rooted in baseball's traditions. The research and development department in the Oakland front office liberated them from this prejudice, and allowed them to demonstrate their true worth.

---

[88] Nate Silver, *The Signal and the Noise: Why So Many Predictions Fail-but Some Don't* (New York, New York: Penguin Books, 2015), 105.

A baseball team, of all things, was at the center of a story about the possibilities—and the limits—of reason in human affairs. Baseball—of all things—was an example of how an unscientific culture responds, or fails to respond, to the scientific method.[89]

In essence, Billy Beane and the Oakland A's sought innovative ways to analyze baseball. Through analysis, they identified insights to inform their strategies within the game and find bargain players with specific statistics to fill their roster. Consequently, the Oakland A's offloaded star players such as Jason Giambi and Johnny Damon and recreated their aggregate on base percentage with three undervalued players including Jeremy Giambi (Jason Giambi's brother), David Justice, and Scott Hatteberg. Everyone in baseball thought Jason Giambi and Johnny Damon were vital to the team's success, and the decision defied the conventional wisdom of Billy's scouting team which had relied on their subjective assessments and intuition. For Billy's team of scouts, with 30 years of experience in baseball, this process was unsettling.

Billy Beane was remarkable because he was able to impose reform on the institution within the Oakland A's. The subjective assessments and biases towards baseball players and their value were well-entrenched and to question this wisdom was blasphemy. There is something fundamentally human and intangible surrounding baseball. Luck, chance, and attributes were considered a part of the game to the point where even the relevant statistics of the game, such as errors, were subjectively collected. Beane's search for new baseball knowledge led him to value those with an outside perspective. Lewis writes:

With that, the coup was complete. Paul's list of hitters were distinctly not guys the scout found driving around. They were guys Paul found surfing the Internet. Some of the names the older scouts do not even recognize. The evaluation of young baseball players had been taken out of the hands of the old baseball men and placed into the hands of people who had what Billy valued the most (and what Billy didn't have), a degree in something other than baseball.[90]

This willingness to experiment and accept an outside perspective proved an essential component to their success. Their efforts changed everyone's understanding of baseball.

---

[89] Lewis, *Moneyball*, 40.

[90] Lewis, 41.

The insights garnered from their models concluded that attributes like a player's footspeed could be overvalued, while a seemingly insignificant detail such as an unorthodox pitching motion could be undervalued.[91] Billy and DePodesta found other statistics, once thought to be relevant, such as team batting averages, had little correlation to scoring runs. Lewis explains:

> By analyzing baseball statistics you could see through a lot of baseball nonsense. For instance, when baseball managers talked about scoring runs, they tended to focus on team batting average, but if you ran the analysis you could see that the number of runs a team scored bore little relation to that team's batting average. It correlated much more exactly with a team's on-base and slugging percentages. A lot of the offensive tactics that made baseball managers famous—the bunt, the steal, the hit and run—could be proven to have been, in most situations, either pointless or self-defeating. "I figured out that managers do all this shit because it is safe," said Alderson. "They don't get criticized for it." He wasn't particularly facile with numbers, but he could understand them well enough to use their conclusions. "I couldn't do a regressions analysis," he said, "but I knew what one was. And the results of them made sense to me.[92]

Discovering relationships between on-base percentages and wins dispelled the false narratives associated with the importance of specific statistics, business practices, and player traits. They found the relationships that mattered such as walks, on base percentages, and slugging percentage correlated with runs which translated to wins.[93] They also found things that did not correlate to runs and wins such as stealing bases and using sacrifice bunts to advance players, so Beane took those decisions out of his manager's hands.[94] The A's would no longer use these tactics because they were statistically detrimental to the team's performance. Beane and DePodesta also changed their business practices to recruit undervalued players out of college in lieu of signing unproven players out of high school

---

91 Lewis, 16.

92 Lewis, 57.

93 Lewis, 55.

94 Lewis, 286.

because college players' statistics were more widely available and validated against better competition.[95]

Beane and DePodesta's statistical models grew progressively more complex as the process continued to prove effective. They contracted a company called AVM Systems to obtain a more sophisticated model of the game.[96] According to Lewis, Ken Mauriello and Jack Armbruster, former statisticians modeling derivatives on Wall Street, created AVM Systems with a data set of every game event from the previous ten years.[97] Mauriello and Armbruster saw an opportunity in baseball due to its inefficient data capture. Statistics such as singles, doubles, or sacrifice flies that baseball recorded proved irrelevant. AVM systems coded the game differently, ignoring the traditional ways baseball was recorded. Lewis also notes Mauriello and Armbruster divided the field into a numbered matrix and captured the velocity and trajectory of every ball hit.[98] He goes on to say the sophistication of the model accounted for every defensive play as well. For example, players were debited and credited for their contributions to events on the field such as a runner's decision to extend their hit into extra bases against a specific player attempting to throw them out. Essentially, Lewis believes AVM Systems captured the complexity of the game and modeled it, thereby removing its mystery. The AVM model proved effective at capturing the value of players. Since using AVM Systems, the Oakland A's have used a form of this model to inform their decisions and strategies with incredible results, thereby changing the way baseball is perceived, managed, and played forever.

4.   Outcome

Beane and DePodesta were essentially counting cards in Las Vegas casinos. The success of the Oakland A's was the proof that their process worked. Lewis remarks, "When I first stumbled into the Oakland front office, they were coming off a season in which they

---

[95] Lewis, 37–38, 99.

[96] Lewis, 130.

[97] Lewis, 131.

[98] Lewis, 132.

had spent $34 million and won an astonishing 102 games; the year before that, 2000, they'd spent $26 million and won 91 games, and their division."[99] It was not the wins that were astonishing, but the price from which they achieved these wins.

The other indicator of success was the rapid rate at which the Oakland A's approach diffused to the other teams. Most teams, even those with robust scouting and development programs like the St. Louis Cardinals, adopted a more analytical approach.[100] Following multiple successful seasons, John Henry, the owner of the Boston Red Sox, offered Billy Beane $12.5 million dollars for a five-year contract.[101] In an interview, Lewis reveals that Henry thought the deal would be a bargain.[102] Billy Beane became more important than any of the players on the roster. Now twenty years later, *Moneyball* is used as a prototypical example of innovation and application of data analytics to radically alter an industry and produce results once thought impossible.

For the three years preceding the publication of *Moneyball*, Lewis adopted Doug Pappas's method of measuring a team's financial efficiency.[103] Lewis describes Pappas's method as measuring how much an MLB organization paid for each win past 49 wins in marginal dollars, assuming the minimum an organization could pay for a team was $7 million. Oakland A's process gave them a quantifiable competitive advantage.[104] Lewis explains:

> Over the past three years the Oakland A's had paid about half a million dollars per win. The only other team in six figures was the Minnesota Twins, at $675,000 per win. The most profligate rich franchises—the Baltimore Orioles, for instance, or the Texas Rangers—paid nearly $3 million for each win, or more than six times what Oakland paid. Oakland seemed to be playing a different game than everyone else. In any ordinary industry the Oakland A's would have long since acquired most other baseball teams, and

[99] Lewis, 132.

[100] Silver, *The Signal and the Noise*, 87.

[101] Lewis, *Moneyball*, 278.

[102] Lewis, 278.

[103] Lewis, 2–3.

[104] Lewis, 2.

built an empire. But this was baseball, so they could only embarrass other, richer teams on the field, and leave it at that.[105]

These numbers are significant because they represent the effectiveness of what a data-driven approach can achieve. Traditional methods were unlikely to yield such positive results because the organizations selected radically different players (e.g., high school players) trying to achieve the same objective of winning games as cheaply as possible. When decisions regarding player selections and strategies were valued more accurately on the strength of their relevance to generating runs and wins, the Oakland A's held the competitive advantage.

5.   Analysis

Michael Lewis describes *Moneyball* as his favorite story as a writer.[106] As Lewis explains, "At the bottom of the Oakland experiment was a willingness to rethink baseball: how it is managed, how it is played, who is best suited to play it, and why."[107] However, the genesis of the Oakland A's willingness to experiment did not start with Billy Beane.

Fiscal challenges, scientific perspectives, and market opportunities combined to generate the organizational culture necessary to support, a former player, Billy Beane's strategy and decisions. First, the organization faced significant fiscal challenges in comparison to other teams. Thus, the A's personified the time-honored adage of necessity driving innovation. Second, a former GM, named Sandy Alderson, approached the game with a scientific perspective, laying the groundwork for Beane and his staff to follow.[108] Alderson came to the organization as a well-educated lawyer from San Francisco and a former Officer in the Marine Corps. This unique background and fresh thinking created an atmosphere within the A's organization culture that defied convention. Third, Billy Beane's background as a former player provided him with a unique perspective, an

---

[105] Lewis, 2.

[106] Michael Lewis, *Michael Lewis Interview on "Moneyball" (2003)* (YouTube, 2017), https://www.youtube.com/watch?v=3JBWSFFAb4w.

[107] Lewis, *Moneyball*, 2.

[108] Lewis, 56.

understanding of the subjective assessments of his scouting staff and biases governing professional baseball should be approached with skepticism. Lastly, the market opportunities in the late 1980s and early 1990s were optimal to attract the interest of statisticians and other parties. Lewis explained that the market opportunities encompassed two parties, those described as hardcore baseball fans and the academically-trained statisticians coming from Wall Street where they applied their skills valuing and trading derivatives. Yet, as opportunities on Wall Street were saturated with statisticians, some applied their trade to other markets such as baseball.

As Malcolm Gladwell concluded in the book *Outliers*, there exists windows of opportunity, transition, and change.[109] Gladwell argues that Bill Gates possessed hidden advantages in large part due to the year of his birth. The opportunity cost for others born before Gates was too large, shifting careers from well-paying jobs building mainframes while supporting a family is a big gamble, and people born after Gates were not old enough to take advantage of the emerging opportunities. Gladwell makes the same argument regarding the top 75 wealthiest people throughout the history of the world; twenty percent were born in the United States during the 1830s. Their birth years postured them to be at their prime in the 1860s and 1870s when the United States underwent a period of great change. Railroads were constructed, Wall Street was established, and industrial manufacturing emerged providing enterprising people with the opportunity to amass fantastic wealth. Similarly, statistics within baseball started changing with people like Bill James self-publishing four paperback books from 1977 to 1980 that shaped Alderson's understanding of the game.[110] It was in this spirit that the Oakland A's found themselves with the necessity and opportunity to test radical ideas.

Despite Lewis's proclamation that "the debate is over," statistical approaches did not displace scouting staffs. If anything, the analytics assist them in making better

---

[109] Malcolm Gladwell, *Outliers: The Story of Success* (New York, NY: Hachette Book Group, Inc., 2008), 42–54.

[110] Lewis, *Moneyball*, 62.

34

decisions.[111] For instance, the budget for the Oakland A's scouting staff actually increased following their run of success. Much like the Oakland A's, most teams adopted a hybrid approach to make informed decision and curb their natural biases. For instance, the Red Sox hired Bill James, a "stathead" or one who evaluated players with statistics, to manage the analytical processes for their organization.[112] As a result, Silver noted, "they won their first World Series title in eighty-six years in 2004 using a fusion approach that emphasized both statistics and scouting."[113] In contrast, one of the few teams that severely cut their scouting budget in favor of a purely statistical approach was the Toronto Blue Jays. The reward for their effort was performing "poorly in drafts from 2002 to 2005."[114]

The case of *Moneyball* is packed with lessons for the Civil Affairs community. There is plenty of conventional wisdom to explain the complexities and uncertainty associated with the various conflicts around the world. As CA forces maintain unprecedented access to information through its civil reconnaissance and civil engagement mandates, it must grapple with the same questions and challenges that Beane and DePodesta confronted. With limited resources, what variables and relationships are the most significant? Which resources and investments are overvalued or undervalued within the foreign assistance, counterterrorism, and development markets? Is it access to unemployed military age males, information, healthcare and clean drinking water, or political access that drive an insurgency? Is it a political narrative reinforcing a targeted social identity?

CA forces must start asking better questions to form their analysis and develop more sophisticated ways of capturing, organizing, and analyzing data to dispel false narratives, reduce the level of subjectivity, bias, and complexity. It should challenge the conventional wisdom prevalent in the defense, diplomatic, and development communities.

---

[111] Silver, *The Signal and the Noise*, 105.

[112] Silver, 91–93.

[113] Silver, 87.

[114] Silver, 87.

The example Lewis provides with *Moneyball* parallels Krohley's argument that the Civil Affairs Branch should focus on producing actionable insights and feed those insights into a more sophisticated targeting mechanism.[115] Currently, CA forces and the Joint Force view the world as the institution of baseball once viewed the game of baseball, overvaluing teams based on team batting averages and players based on their footspeed. The Civil Affairs Branch must learn from this lesson and begin playing a different game if it wishes to compete in a hybrid environment against near-peer threats. A game driven by data analysis, modeling, and insights into the operational environment that direct its strategies and investments. Gladwell's window of opportunity has opened with the great transition occurring in both warfare and U.S. Forces. Current members of the CA community must be provided the opportunity to think differently and apply their talents to provide disruptive impacts within the operational environment.

B.   JACK MAPLE, COMPSTAT, AND FIGHTING CRIME WITH DATA

> Jack said that he was getting an education in Times Square. He said he was getting a master's degree in crookology. He was starting to believe that he could read crime the way, like, a weatherman can read a weather pattern.
>
> —PJ Vogt, The Crime Machine[116]

1.   Background

In their *New York Times* Bestseller *Freakonomics*, Levitt and Dubner evaluated several topics using economic and statistical studies to reveal the hidden relationships between industries, actors, and events. One question they sought to answer was, "Where have all the criminals gone?"[117] From 1975 to 1990, the crime rate increased 80 percent in the United States.[118] Experts like criminologist James Alan Fox forecast the coming

---

[115] Krohley, "Integrating Civil Affairs."

[116] PJ Vogt, "The Crime Machine, Part I," mp4, Reply All, accessed February 27, 2019, https://gimletmedia.com/shows/reply-all/o2hx34.

[117] Steven D. Levitt, *Freakonomics: A Rogue Economist Explores the Hidden Side of Everything*, Rev. and expanded ed. (New York, NY: William Morrow, 2006), 115.

[118] Levitt, 117–18.

decade to be a "bloodbath" as crime rates would continue to rise.[119] Former cops, like Bill Courtney, agreed with Fox's assessment.[120] His characterization of the crime in New York City equated to a reoccurring nightmare. In an interview with PJ Vogt, Courtney describes the situation in visceral detail:

> BILL: All right, so I, uh, I became a transit cop in 1983. You, you just can't understand how bad it was back then. I don't know like when you were born, but–
>
> PJ: '85.
>
> BILL: Okay. When you were five years old, New York City was a horror show.
>
> NEWSCLIP: This is WYNN. And the murder rate just keeps on rising.
>
> BILL: It was just one horrific event after the next.
>
> NEWSCLIP: That's an average of five or six homicides a day.[121]

Bill Courtney's experience and perspective as a police officer provides insight into the New York Police Department (NYPD) officers' abject hopelessness towards their responsibility of enforcing the law and protecting their citizens. This feeling of hopelessness was a reflection of an ineffective system in dire need of transformation. Similar to the Oakland A's, the situation facing the New York City Police Department (NYPD) was daunting and required innovative solutions to confront the growing crime epidemic.

At the peak of the crime epidemic, the citizens of New York City elected Rudolph "Rudy" Giuliani and William Bratton as their Mayor and Police Commissioner. Giuliani's political campaign promised to clean up the streets of New York City, which had transformed into a criminal cesspool. Consistent with Giuliani, Bratton claimed he would cut crime in the city by half. The question was how they intended to keep their political campaign promises. What followed was what Bill Bratton called the "Athenian period," in

---

[119] Levitt, 118.

[120] Vogt, "The Crime Machine."

[121] Vogt.

which political leadership and law enforcement leadership demonstrated a willingness to implement different policing policies to end the crime epidemic in their city.[122]

2.   Problem

In the early 1990s, the problem facing the New York City Police Department (NYPD) was how to confront the growing crime epidemic afflicting their city without the data to understand the full scope of the problem, a clear strategy for dealing with the crime epidemic, and accountability mechanisms to hold precincts accountable for their crime. All of the NYPD's previous efforts and policing policies had proved ineffective. Reactive and community-policing policies were insufficient to deter criminal activity.[123] Moreover, the NYPD lacked meaningful data, a means to understand the scope of crime in the city. Also missing were critical forms of accountability and a strategy of policing capable of reducing crime.[124] The consensus within the contemporary literature suggests that the city was descending into lawlessness and chaos.[125] Additionally, the NYPD lacked a comprehensive understanding of the crime in their city, specifically its scale and sophistication. Policing strategies capable of combating and preventing crime events throughout the city were required. The systems of local policing had proven ineffective at recognizing criminal patterns and connecting crime events that police departments considered mutually exclusive. The system of community policing created an atmosphere of hopelessness for those in law enforcement. The combination of these factors contributed to the overall receptiveness to changes in policing policy and strategy among New York City's political leadership, NYPD's leadership, and the citizens residing in the city.

---

[122] Levitt, *Freakonomics*, 126.

[123] Jerry Ratcliffe, *Intelligence-Led Policing*, Second Edition. (London: Routledge, Taylor & Francis Group, 2016), 2.

[124] Vogt, "The Crime Machine."

[125] Levitt, *Freakonomics*, 117–45; Vogt, "The Crime Machine."

3.   Innovation

Problem-oriented and intelligence-led policing concepts to solve the criminal pandemic in New York City would emerge from an unlikely character who created CompStat. His name was Jack Maple. All accounts of Maple, a New York City Transit Police Officer, describe him as an intelligent, abrasive, and stubborn man with a unique sense of style and personality.[126] Both his partner, Bill Courtney, and his wife, Bridgid O'Connor, describe Maple as a brilliant analytical thinker convinced that the NYPD's approach towards fighting crime was archaic and misguided.[127] However, Maple's perspective rarely aligned with that of his leadership. This resulted in several situations where Maple found himself at risk of losing his job or being reassigned to other precincts two hours away from his residence as punishment tours.

Transit officers were assigned to protect transit centers and transportation infrastructure that spanned the city. Maple used his mandate as a transit officer and his inductive reasoning to go where he thought the criminals would be. The logic of Maple's approach seems to be captured in a model later developed by Clarke and Eck as described in Tim Newburn's *Handbook for Policing*, where crime events depend on the convergence of offender, target/victim, and location.[128] For example, Maple noted that subway stations in specific locations like Times Square experienced bottlenecks during periods of heavy traffic, and these bottlenecks were likely to attract pickpockets.[129] Undeterred by punishment assignments and convinced his methods were valid and necessary, Maple found his way into assignments that revealed his potential for applying predictive analysis to the crime epidemic in New York City, and with each success he was promoted to positions where he could implement his methods on incrementally larger scales.

---

[126] Vogt, "The Crime Machine."

[127] Vogt.

[128] Tim Newburn, *Handbook of Policing* (Cullompton, Devon, UK: Willan Pub, 2012), 418.

[129] Vogt, "The Crime Machine."

Eventually, Maple worked his way into various projects within the transit system where he proved capable of developing innovative solutions to criminal challenges. One such problem was an increased prevalence of random wolfpack attacks of subway patrons.[130] These violent attacks consisted of 20 to 30 assailants using knives and box cutters against their victims. Jack had a task force composed of 24 transit police officers and used a mixture of analysis and deception to reduce the number of attacks from 1,200 to 12 in one year. Following his success against the wolfpack attacks, Maple pitched the big idea of the "Charts of the Future" that resembled a crafts project. Maple instructed Bill Courtney to cover the walls of their office in paper and recreate the New York City Subway's 430 stations. On this creation, Maple and Courtney coded the criminal activity reported and plotted it with markers and stickers of specified colors. This allowed them to temporally and geospatially depict where and when crime would occur. This analog visual representation of the New York City transit system, coupled with analysis, aided the team's effort to isolate rail lines at specified times to disrupt criminal activity. The result of Jack's operational insights was a 30 percent drop in felony crime in two years.[131] Maple's method proved successful because it produced operational insights that predicted the likelihood and location of criminal activity. Thus, the chaos of New York no longer extended into its subways, which was once a place where crime thrived.

In 1993, when Bill Bratton assumed his position as New York City's Police Chief, he made two bold claims. First, he announced he would cut crime in half. Second, Bill Bratton announced Jack Maple as his second-in-command to oversee the transformation of the NYPD and achieve the target reduction in crime. Both of these proclamations came as quite a shock to many within the ranks of the NYPD. Yet, Maple proved his worth and ability to apply analytical methods to fight crime. Bratton's promotion provided Maple with the opportunity to once again apply his analytical methodology on a larger scale. The broad authority Bratton provided Maple enabled him to make sweeping changes, hold people accountable, and investigate crimes that the NYPD had previously neglected

---

[130] Vogt.

[131] Vogt.

investigating. The prevailing perspective was that the NYPD would only investigate crimes perpetrated against affluent citizens and cases guaranteed to make the nightly news. For example, the NYPD precinct in Manhattan had a policy restricting investigations of burglaries in the amount of $10,000 or less. Maple's philosophy made it clear that all crime victims would be represented, which marked a significant change in the NYPD and inadvertently changed the relationship with the citizens of New York City.

Maple was not the prototypical cop. If anything, he was its antithesis. Many within the leadership of the NYPD hated Jack Maple because they deemed him to be a "fat freakin' transit cop in a bowtie" who essentially told them that they were incompetent.[132] The transformation within the NYPD was going to be uncomfortable for the leadership at the precinct level. Unfortunately, the Precinct Chiefs maintained an unwritten policy of omission. They did not report the crimes they deemed unimportant to the commissioner. This lack of accountability created a blind spot for the commissioner, as precincts vastly underreported their crime statistics.

Now armed with the data, Maple, as the Deputy Police Commissioner, could hold the old chiefs accountable for the crime in their precincts. He held his notorious CompStat briefings daily with the Precinct Chiefs at NYPD Headquarters. Maple demolished the NYPD leadership's unwritten policy of either underreporting or omissions in crime reporting with data. PJ Vogt describes these meetings as an inquisition stating:

> Police chiefs, like 50-year-old men, would vomit in the bathroom before CompStat meetings. They would try to find friends in the department who could tip them off to see if they were up next. These were guys who lived in neighborhoods where they ran little armies of 300 men who had to obey every single one of their orders, who could never question them about anything. And now, they had to go to this other room, where they stood in front of a guy in a bowtie, surrounded by everybody they'd ever wanted to impress, 200 of their scariest peers, and they just got their lives nitpicked apart. They got asked the kind of follow-up questions you ask somebody on their first day of the job when you're convinced they know nothing. And if they couldn't answer those questions right, they were humiliated. And then

---

[132] Vogt.

they were fired. One chief told a reporter, "If they're going to keep having these meetings, they should really have us check our guns at the door."[133]

This new mechanism for accountability, enabled by crime data, brought police into crime hotspots regardless of their location. As Ratcliffe explains, "CompStat is an accountability process that aims to empower mid-level commanders to seek rapid response to emerging crime problems and hotspots."[134] Ratcliffe further asserts that CompStat set the foundation for both problem-oriented and intelligence-led policing, allowing the NYPD to determine priorities and allocate resources more objectively. So, what started as "Charts of the Future" evolved into a comprehensive CompStat system comprised of a functioning database of criminal activity and morning accountability meetings between Jack Maple, the Deputy Police Commissioner, and his precinct chiefs.

CompStat extracted three key insights. The first insight was that the precinct chiefs misrepresented the severity and frequency of crime in their reports to the Police Commissioner. Following the implementation of CompStat, a second insight surfaced; NYPD was not fighting crime evenly. Maple challenged precinct commanders and ensured that low-level crime was confronted across the city. The third insight CompStat revealed was that a disproportionate amount of crime could be attributed to a smaller population of criminals in a Pareto distribution.[135] This revelation would result in the NYPD adopting policing strategies and policies designed to target and arrest these prolific offenders and keep them off the streets.

---

[133] Vogt.

[134] Ratcliffe, *Intelligence-Led Policing*, 3.

[135] The Pareto principle is a well-known distribution concept claiming that 80 percent of the effects can be attributed to 20 percent of the causes. The Pareto principle applied to crime in New York City would indicate that 20 percent of the criminals were responsible for committing 80 percent of the crime. Vogt, "The Crime Machine."

4.   Outcome

Crime rates started their dramatic decrease in the early 1990s.[136] There were a number of explanations for this new trend including "innovative policing strategies, increased reliance on prisons, changes in crack and other drug markets, aging of the population, tougher gun-control laws, a strong economy, increased number of police, and a number of other explanations such as an increased use of capital punishment, concealed-weapons laws, and gun buybacks."[137] During their research, Levitt and Dubner found innovative policing strategies received the most citations in their LexisNexis search.

According to Levitt, the innovative police strategies enabled the largest reduction in crime rate of any large city in the United States. He states, "homicide rates fell from 30.7 per 100,000 people in 1990 to 8.4 people per 100,000 in 2000, a change of 73.6 percent."[138] The statistics offered by former NYPD officials suggest that the implementation of CompStat reduced murders by 20 percent in its first year, and by the end of 1995, all felony crime fell by 39 percent.[139] These are drastic differences from the decade predicted to be a bloodbath. Levitt argues that innovative policing strategies had little to do with the crime reduction, instead attributing the crime reduction to the 45 percent growth of police officers within the NYPD and the court case decision in *Row v. Wade* in 1973 that legalized abortion.[140] The legalization of abortion reduced the population with the greatest propensity to commit crime, the children of single parents, which roughly doubles their probability of committing crime. Despite the difference in attribution, the crime rate fell dramatically in New York City and CompStat rapidly diffused to police departments around the world.[141]

---

[136] Levitt, *Freakonomics*, 118.

[137] Levitt, 119.

[138] Levitt, 128.

[139] Vogt, "The Crime Machine."

[140] Levitt, *Freakonomics*, 138–39.

[141] Ratcliffe, *Intelligence-Led Policing*, 3.

5.   Analysis

The CompStat story contains numerous lessons for developing and implementing data-driven approaches, serving as a prototypical example of an organization solving a complex problem through innovative data analysis and visualization techniques. The NYPD's geospatial, temporal, and statistical analyses reduced the complexity of criminal activity and allowed the NYPD to focus their attention and effort on the relevant factors, much like the Oakland A's did in the *Moneyball* story. These techniques provided the framework for establishing department priorities and allocating resources effectively.

CompStat revealed the scope of the crime epidemic problem in the city. Precinct Chiefs had been underreporting the crime in their precincts to the Police Commissioner. Unless the specific crime was going to make the nightly news cycle, it went largely unreported to police headquarters, which had not prioritized data collection for anything other than political purposes.[142] These processes are somewhat similar to the reporting functions within a military organization, in which the commanders set their Commanders Critical Information Requirements (CCIR) and Priority Information Requirements (PIR), defining the criteria needed to be reported immediately to the commander for action (such as troops in contact (TIC) or an injury to a service member). Jack Maple's revelation that crime was not being reported by his precinct chiefs led him to believe he needed to break the pervasive environment of omission and little accountability. This revelation is described in one of Jack Maple's interviews, where he describes an interaction with operations center at NYPD headquarters:

> PJ: Crime victims who were poor, crime victims who were people of color, the crime that happened to them, in a million different ways, it was just invisible to the police department. Mike says, right in the beginning, he remembers Jack actually trying to show him how bad it was.
>
> MIKE DALY: And I was with him his first night, he was driving around, and he, he called operations, says, "You know anything going on?" They said, "No all's quiet commissioner." He goes, "How about any homicides? You got any homicides?"

---

142 Vogt, "The Crime Machine."

"Well, well we got two in Brooklyn." "Oh, yeah?" "Yeah." "How about the Bronx?" "Yeah. We got two there too." "Oh yeah, what about Queens?" "One." He said, "What about Manhattan?" "Well, we got one there too, but it's above 125th Street." He goes, "All's quiet though." "Yeah all's quiet, commissioner."[143]

The passage is revealing in the sense that it provides granular context to the problems the NYPD faced and the perspectives of the police officers involved. The interaction reveals the status quo apathy that existed at the time among the police officers working at the precincts. Once Maple was armed with data, he used it to address crime wherever it was prevalent. Another portion of the interview highlights Maple challenging the conventional policing wisdom of the time, observing:

> PJ: People were terrified of Jack. He told this story about berating this cop from narcotics because he found out the guy had been ignoring complaints he was getting from people who were upset about crack deals that were happening outside of their houses.

> JACK: You know, these fucking people are afraid here. We gotta do something about this. And he said to me, "You know, what do you want to make these low-level cases for? We want to make the big cases." I said, "Where do you live? Where do you live? In Clarkstown or one of these places?" I said, "What did you pay? What was your house? 300,000, 350? Got a nice little police department there?

> PJ: Clarkstown was a rich white suburb. Jack was saying, what if tomorrow morning, somebody was selling drugs outside your house in Clarkstown?

> JACK: You think you'd be on the phone to the Clarkstown fuckin' cops? And would you want them arrested? And if they said to you, "Gee, don't you understand? They're just low-level guys. We're waiting for the big case. And we're going to be done with the big case in a year. You think that would be all right if your children were stepping over crack vials on their way to school?" And he said to me, I mean he was great, he said to me, "You know, you're right."

> PJ: As much as it made everybody hated Jack, CompStat worked. The crime rate in New York City plunged.[144]

---

143 Vogt.

144 Vogt.

Jack Maple urged action, and in doing so, he restored troubled communities' faith in their police precincts that neglected crime they deemed irrelevant. Consequently, the citizens of New York City rewarded the NYPD with a broad latitude to enforce the law.

The transition to a data driven-approach was not easy for the NYPD. It took a determined, innovative personality and commitment of personal capital from the NYPD leadership to bring about organizational change. These transitions are difficult because they alter the former relationships and incorporate measures of accountability which are not always comfortable for some actors. The problem was the NYPD operated with a blind spot in their shared common operating picture. It was not comfortable for the leadership at the precinct-level because they had never been critically assessed or questioned. The resulting accountability, however, was essential to understanding their challenges. Once the data was collected, processed, and analyzed, the NYPD integrated their insights into new policing strategies and policies. As the data revealed the disproportional distribution of crime among offender populations, the police began to arrest people for jumping subway turnstiles and urinating in the streets. The data revealed the more likely criminals were to commit lower offenses, the more likely they were to commit more grievous offenses.

The CompStat story offers several lessons for the CA Branch. While the Civil Affairs Branch uses geospatial and temporal analysis, it has a difficult time analyzing the data and extracting insights. Many of the CA insights are derived from inductive observations, not from analysis. Hence, the emphasis is placed on civil reconnaissance and civil engagement. CompStat shows that effective data capture and analysis should focus on reducing the complexity of the operating environment. CompStat also shows that innovation should come from within the organization. Similar to the case of *Moneyball*, the data-driven innovation came from within the NYPD. CompStat was the brainchild of Jack Maple. He used the methods available at the time to enhance his organization's situational awareness, both when he was a transit police officer and, subsequently, on a larger scale when he was the Deputy Police Commissioner of New York City. CA forces could benefit from emulating the analytical and integration aspects of CompStat to generate new knowledge and pathways to compete under the threshold of armed conflict.

The integration of insight into operational approaches and strategies represents the other problem facing the CA community. The doctrinal products CA is tasked with producing make it difficult to assess the operational variables relevant to understanding events and relationships within the proper socio-political contexts. CompStat captured the data needed to determine where the NYPD should invest their resources. Their analysis linked situational awareness, accountability, and a target criminal population. Consequently, the NYPD altered its policies to address these problems. This move resulted in more effective police operations and a significant reduction in crime. The CA branch should focus on developing an analytic capability that produces similar insights, such as determining which actors or groups are more likely to influence IPI political structures, and build a more objective, common understanding of the relevant relationships in the operating environment.

C.   ARCHIE COCHRANE AND EVIDENCE-BASED MEDICINE

> It was the absence of doubt—and scientific rigor—that made medicine unscientific and caused it to stagnate for so long.
>
> —Philip E. Tetlock[145]

1.   Background

In his book *Superforecasting*, Philip Tetlock uses examples from several professions to illustrate points about forecasting.[146] Two examples that reoccur throughout his book are meteorology and medicine. This case study focuses on the later, specifically evidence-based medicine and its champion Archie Cochrane.[147] Tetlock describes Archie Cochrane as a renowned British obstetrician and epidemiologist who argued the British National Health Service (NHS) should institute random controlled trials of medical

---

[145] Philip E. Tetlock and Dan Gardner, *Superforecasting: The Art and Science of Prediction*, Kindle Edition (New York, NY: Crown Publishers, 2015), 30.

[146] Tetlock and Gardner, *Superforecasting*.

[147] Tetlock and Gardner, 25.

interventions in the 1950s and 1960s with little success.[148] Prior to evidence-based medicine, little critical assessment of medicine existed. Tetlock describes the history of medicine as "blind men arguing over the color of the rainbow" and uses a passage from a British physician named Druin Burch. Burch describes "most histories of medicine as strikingly odd" as "they provide a clear account of what people believed they were doing, but almost none at all of whether they were right."[149] Tetlock agrees and suggests that in the not-too-distant past, the sick were often better off without the care of physicians because their treatments and interventions were either ineffective or counterproductive. For example, prescriptions of bloodletting and doses of mercury to induce diarrhea failed to save George Washington's life when he fell ill in 1799.[150] In fact, it is more likely these interventions served as a catalyst for his death.

Tetlock proposes that the administration of medicine lacked doubt. Each observation where a patient's condition improved fed their physician's confirmation bias, and every intervention failure was attributed to an incurable ailment. Tetlock's example of Galen, a renowned physician from the Roman Empire and medical authority for millennia, demonstrates the point clearly. Galen wrote of one of his treatments, "All who drink of this treatment recover in a short time, except those whom it does not help, who all die… It is obvious, therefore, that it fails only in incurable cases."[151] Historically, medical literature was composed by men convinced of their own expert judgment, yet many of their proposed treatments were wrong and dangerous. Tetlock notes two events that almost provided the needed breakthroughs, as advances in medicine had stagnated. The first event was an early design of a random controlled trial in 1747. Tetlock writes:

> The cure for this plague of certainty came tantalizingly close to discovery in 1747, when a British ship's doctor named James Lind took twelve sailors suffering from scurvy, divided them into pairs, and gave each pair a different treatment: vinegar, cider, sulfuric acid, seawater, a bark paste, and citrus fruit. It was an experiment born of desperation. Scurvy was a mortal

---

[148] Tetlock and Gardner, 30.

[149] Tetlock and Gardner, 25–26.

[150] Tetlock and Gardner, 25.

[151] Tetlock and Gardner, 26.

threat to sailors on long-distance voyages and not even the confidence of physicians could hide the futility of their treatments. So Lind took six shots in the dark—and one hit. The two sailors given the citrus recovered quickly. But contrary to popular belief, this was not a eureka moment that ushered in the modern era of experimentation. "Lind was behaving in what sounds a modern way, but had no full understanding of what he was doing," noted Druin Burch. "He failed so completely to make sense of his own experiment that even he was left unconvinced of the exceptional benefits of lemons and limes. For years thereafter, sailors kept getting scurvy and doctors kept prescribing worthless medicine.[152]

Another attempt at instituting evidence-based medicine occurred in 1921. A British statistician named Austin Bradford Hill responded to a question in *Lancet* and "laid a template for modern medical investigation," yet the medical community failed to adopt it as a standard practice.[153] The champions of random controlled trials were met by an apathetic and even hostile medical institution.[154]

2.   Problem

The central problem in this case is a medical community convinced of the efficacy of its treatments without scientific validation through controlled experiments. In other words, the medical community relied on subjective judgment to determine the efficacy of treatments in lieu of scientific evidence, and stymied attempts at scientific evaluation.

3.   Innovation

The innovation came in the form of random controlled trials (RCT). While a few innovators within the medical, scientific, and mathematics disciplines advocated for its use, the issue largely fell on deaf ears. There was little interest in testing the sound judgment of respected physicians and their treatments. However, Archie Cochrane persuaded the National Health Service to grant him a randomized trial to test the efficacy of his newly

---

[152] Tetlock and Gardner, 28.

[153] Tetlock and Gardner, 28.

[154] Tetlock and Gardner, 30.

established hospital cardiac care units.[155] Cochrane randomly selected patients for either admission into the cardiac care units or home for bed rest.[156] As the trial progressed, a group of physicians tried to stop the trial out of concern for the patients denied access to care within the cardiac care units. The demands intensified after Cochrane provided them with the opposite of the preliminary results. The physicians accused him of being abusive and unethical. Yet, when Cochrane revealed the truth that home care performed slightly better than the care units, the group responded with silence.

4.   Outcome

Following the trial, Cochrane published his 1973 book, *Effectiveness and Efficiency: Random Reflections on Health Services,* in which he "questioned the very manner in which medicine was practiced and called for the rigorous evaluation of *effectiveness* (whether treatments actually work) and *efficiency* (whether treatments represent the optimal use of available resources)."[157] Cochrane unabashedly states that the only way to measure the effectiveness of treatments was to test them in randomized controlled trials (RCT). Cochrane also noted that the basis for treatment decisions must be determined on evidence "rather than on the basis of hearsay, imagined efficacy, or the 'standard operating procedure' mentality that so often fails to consider alternative scenarios, derogatory side effects, long-term damage, and blatantly contradictory information."[158] Essentially, Cochrane made an unequivocal case for RCTs and laid the foundation for evidence-based medicine (EBM). He forced the medical community to question itself and define what constitutes clinical judgment.

After Archie Cochrane published *Effectiveness and Efficiency: Random Reflections on Health Services*, RCT became the standard protocol for assessing the effectiveness of medical interventions and laid the foundation for EBM that became a standard throughout

---

[155] Tetlock and Gardner, 30; Fisher, Johnston, and Clement, "Is Intelligence Analysis a Discipline?," 62.

[156] Tetlock and Gardner, *Superforecasting*, 30–31.

[157] Fisher, Johnston, and Clement, "Is Intelligence Analysis a Discipline?," 62.

[158] Fisher, Johnston, and Clement, 62.

the medical community. This critical assessment feature was responsible for more effective and efficient medical interventions that enhanced the standards of medicine for five decades. Consequently, the consensus among medical professionals is clear; they attribute many of the advances made in modern medicine to Cochrane's work.

5.   Analysis

Archie Cochrane's story highlights an issue common to a number of professions. His argument made an authoritative institution question its body of knowledge; a task that makes most humans uncomfortable – especially authority figures with strong convictions and reputations to protect. The process of implementing RCTs and EBM is the prototypical example of confronting conventional wisdom in an institution uninterested in change. It took someone with a forceful personality such as Archie Cochrane to belittle the opposing argument and reveal its ignorance. It was no longer acceptable for medicine to remain unscientific. Tetlock illustrates this point when he writes:

> This seems stunningly obvious today. Randomized controlled trials are now routine. Yet it was revolutionary because medicine had never before been scientific. True, it had occasionally reaped the fruits of science like the germ theory of disease and the X-ray. And it dressed up as a science. There were educated men with impressive titles who conducted case studies and reported results in Latin-laden lectures at august universities. But it wasn't scientific.[159]

What was clear to Cochrane then, and is obvious now, is the "only alternative to a controlled experiment that delivers real insight is an uncontrolled experiment that produces merely the illusion of insight."[160] Tetlock characterizes the result of retaining the status quo as "the same toxic brew of ignorance and confidence that had kept medicine in the dark ages for millennia."[161] The advent of RCTs and EBM provided the analytical base to revolutionize how doctors conducted clinical trials, conducted research and published

---

[159] Tetlock and Gardner, *Superforecasting*, 29.

[160] Tetlock and Gardner, 32.

[161] Tetlock and Gardner, 32.

articles, and shared evidence. This methodology and technique made progress possible in medicine.

While Cochrane's argument and his legacy have left an indelible impact on the medical community, his argument and insights are applicable across other disciplines, particularly intelligence analysis and forecasting. Philip Tetlock uses Cochrane's random controlled testing to test experts' ability to forecast. He researched methods to test the accuracy of United States Intelligence Community's (IC) forecasts of events and trends in a multi-billion dollar study consisting of twenty-thousand participants sponsored by the Intelligence Advanced Research Projects Activity (IARPA).[162] Tetlock and his team, on the Good Judgment Project (GJP), determined there were ways of thinking and methods that could help increase the accuracy of forecasts. They proved it by beating the control and academic teams by a margin of 30–70 percent over the initial two years of four-year tournament. Thus, Tetlock is considered one of the leading authorities on the topic of forecasting and how to improve an organization's ability to make sound judgments about future events.

Archie Cochrane would be proud. In his early criticisms of the National Health Service, he recommended the British government should conduct controlled testing of its political policies to see which ones were effective and efficient. This is precisely what CA analysts should be doing, yet innovators are met with significant resistance in much the same way Archie Cochrane and his predecessors were in an earlier era. As in the *Moneyball* and CompStat cases, CA analysts must isolate the correlations between operational variables and determine which courses of action are likely to bring about the desired effects. Therefore, there is an element of forecasting and critical assessment necessary to measure the effectiveness of CAA. The Civil Affairs Proponent highlighted the need to incorporate modeling into their concept of civil knowledge integration in their *Civil*

---

[162] Tetlock and Gardner, 16–17.

Affairs: 2025 and Beyond.[163] As the CA Proponent investigates how to integrate these capabilities, they should consider Tetlock's description of Bill Gates's perspective:

> I have been struck by how important measurement is to improving the human condition," Bill Gates wrote. "You can achieve incredible progress if you set a clear goal and find a measure that will drive progress towards that goal…This may seem basic, but it is amazing how often it is not done and how hard it is to get right." He is right about what it takes to drive progress, and it is surprising how rarely it's done in forecasting.[164]

Measuring the civil component is the key to progress in the arenas where the United States typically struggles. Perhaps better methods of analysis will yield insights that improve the effectiveness and efficiency of CAA.

D.   APPLYING ALGORITHMS TO DIAGNOSING HEART ATTACKS

> It is much more gratifying to come up with a decision on your own. Anyone can follow an algorithm. There is a tendency to say, "Well, certainly I can do better. It can't be this simple and efficient; otherwise, why are they paying me so much money?
>
> —Arthur Evans[165]

1.   Background

In 1996, Cook County Hospital altered the way doctors diagnose patients coming into the Emergency Department (ED) suffering from symptoms of onset heart attack, namely complaints of chest pain. According to Gladwell, Cook County hospital was famous for its trauma care, due to Chicago's rampant gang violence, and its notorious lack of resources. Gladwell writes:

> As the city's principal public hospital, Cook County was the place of last resort for hundreds of thousands of Chicagoans without health insurance. Resources were stretched to the limit. The hospitals cavernous wards were

---

[163] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*, 8.

[164] Tetlock and Gardner, *Superforecasting*, 15–16.

[165] Malcolm Gladwell, *Blink: The Power of Thinking Without Thinking*, First eBook Edition (New York: Hachette Book Group USA, 2007), 138–39.

built for another century. There were no private rooms, and patients were separated by flimsy plywood dividers.[166]

The hospital was in poor condition. It lacked resources such as nurses and physicians, but, more critically, it lacked the infrastructure to support its patients. The hospital had one bathroom to support its patients and lacked air conditioning which led to heat-indexes in excess of 120 degrees in the ED. The ED maintained an unceasing volume of patients estimated at 250,000 annually. Thus, there is sufficient evidence to suggest that the hospital and its staff were completely overwhelmed. In 1996, Brendan Reilly accepted the position as the Department of Medicine's Chairman. Due to the constant chaos within the hospital, he directed protocols for specific populations which included homeless patients suffering from asthma and those suffering from chest pain. This case study focuses on the later population. Gladwell notes that roughly 30 patients a day filtered into the ED with concerns that they might be experiencing a heart attack.[167] These patients consumed more resources than other patients in the form of doctor and nurse attention and duration in hospital beds. Complicating matters further, the treatments were equally resource intensive and sophisticated, yet Reilly described their results as "maddeningly inconclusive."[168]

2.   Problem

The problems facing Brendan Reilly were numerous and overwhelming, yet Reilly's experiment would focus on the one problem that monopolized hospital resources with the least certain outcomes. There was obviously a problem with the volume of patients, yet the principal problem facing Reilly was twofold. First, he needed to reduce the domination of resources by the patients complaining of chest pain. Second, he needed to develop a protocol that added certainty to the notoriously inconclusive outcomes resulting from the current treatment protocol.

---

[166] Gladwell, 98, 235.

[167] Gladwell, 99, 235.

[168] Gladwell, 99.

The current protocol consisted of nurses taking the patient's blood pressure, a doctor listening to the patient's lungs with a stethoscope, a battery of questions assessing the acuteness and duration of pain, an assessment of lifestyle risk factors such as exercise and drug use, and patient history such as cholesterol and diabetes.[169] Following the initial treatment protocol, technicians then applied sensors on the patient, preparing them for their connection to echocardiogram (ECG) equipment. Despite the ECG being a valuable tool, it was not always useful in identifying those in serious trouble until the onset of the heart attack. Other methods existed to obtain a more accurate diagnosis of a patient's condition, yet the process involved testing a particular set of enzymes which required hours to obtain a result. These were hours a patient with serious chest pain might not have for adequate intervention. Consequently, doctors made their assessment based on the best available information from the treatment protocols that Reilly assessed as inaccurate due to the significant variation among cases. Gladwell writes:

> One of the things Reilly did early in his campaign at Cook, for instance, was to put together twenty perfectly typical case histories of people with chest pain and give histories to a group of medical doctors- cardiologists, internists, emergency room docs, and medical residents- people, in other words, who had lots of experience making estimates about chest pain. The point was to see how much agreement there was about who among the twenty cases was actually having a heart attack. What Reilly found was that there really wasn't any agreement at all. The answers were all over the map.[170]

During Reilly's evaluation of Cook County Hospital's protocols, he found that among his staff, no consensus existed among the experts. Gladwell claims that between two and eight percent of patients who enter emergency rooms experiencing a heart attack get sent home. Doctors mitigate this uncertainty by erring on the side of caution, yet this results in a hidden cost because only ten percent of the patients arriving in ERs are in the process of experiencing a heart attack. Exposure to malpractice lawsuits creating more risk averse doctors and constrained budgets forced Cook to find an innovative method for determining a more conclusive result. With hospital beds' rate at $2,000 per night and potential for

---

[169] Gladwell, 100.

[170] Gladwell, 100.

patients to remain for three days for observation, unnecessary costs were untenable. These circumstances forced hospital administrators and doctors to question the utility of their current protocols.[171]

3.   Innovation

Consistent with prior case studies, this case features an enterprising leader fitting the profile of what Philip Tetlock would describe as a fox, who "knows many things" in contrast to its antithesis, the "hedgehog [which] knows one big thing."[172] Reilly interpreted information from a multidisciplinary background. He was open-minded, systems and data-driven, and willing to try something innovative thereby challenging the conventional wisdom resident within the established protocol. He dedicated time and effort into understanding the problem holistically from a decision-making and statistical basis. By deciding to try something radical, Reilly adopted the research of Lee Goldman, who collaborated with a team of mathematicians to determine which risk factors were significant in predicting whether a patient was experiencing a heart attack and reduce the uncertainty surrounding the decision.[173] After evaluating hundreds of cases, the team concluded that a combination of an ECG and three risk factors determined the need for immediate intervention. Gladwell describes the three risk factors as "(1) Is the pain felt by the patient unstable angina? (2) Is there fluid in the patient's lungs? (3) Is the patient's systolic blood pressure blow 100?"[174] The team developed and refined an algorithm to predict the probability of a heart attack. Goldman constructed a decision tree protocol that categorized patients on the basis of their combination of risk factors evidenced as symptoms. Despite the interest in his articles, no one would volunteer to test his research. Consistent with the other cases, the lack of interest in testing Goldman's research most likely stemmed from an unwillingness to accept the possibility that an algorithm could

---

[171] Gladwell, 101.

[172] Tetlock and Gardner, *Superforecasting*, 69.

[173] Gladwell, *Blink*, 103.

[174] Gladwell, 103.

outperform subject matter experts, in this case, medical professionals. Interestingly, the Navy sponsored Goldman's research due to their need to assess patients experiencing chest pain on submarines. The U.S. Navy needed a way to assess the severity of the situation with more certainty to preserve their operational security.[175]

4.   Outcome

Brendan Reilly implemented Goldman's algorithm following a two-month trial period where doctors used the status quo cardiac protocols and their own judgment. Over the next two years, the Cook County ED analyzed patient data with the results of Goldman's algorithm outperforming physician estimates by 70 percent. Physicians estimated correctly 75 to 89 percent of the time, while Goldman's algorithm predicted correctly 95 percent of the time. Consequently, Cook County Hospital was the first hospital to adopt the algorithm for assessing suspected heart attack patients. The algorithm became the standard assessment protocol for assessing patients arriving in emergency rooms throughout the United States with symptoms of myocardial infarction, commonly known as a heart attack.[176]

5.   Analysis

The case study of Brendan Reilly and the Cook County Hospital, while unique, is not uncommon. Reilly's multidisciplinary and data-driven background clearly helped him understand that the status quo protocols were inconclusive and warranted further scrutiny. The lack of critical assessment and analysis of the relevant relationships among risk factors would lead to an opportunity using an evidenced-based approach. However, this case represents more than finding an innovative solution to a problem that strained resources. Only after Goldman and his researchers considered the relationships between risk factors and constructed an algorithm based on their available data, could they distill the data down

---

[175] Gladwell, 104.

[176] Michael C. Kontos, Deborah B. Diercks, and J. Douglas Kirk, "Emergency Department and Office-Based Evaluation of Patients With Chest Pain," *Mayo Clinic Proceedings* 85, no. 3 (March 2010): 284–99, https://doi.org/10.4065/mcp.2009.0560.

to relevant factors.[177] This synthesis and distillation reduced the complexity of the task of determining the severity of a patient's condition and uncertainty surrounding the assessment. In addition to reducing the complexity of the task, the algorithm provided the means for overcoming human bias inherent in the decision-making cycle of all humans, even subject matter experts, resulting in a more objective assessment of reality with a known standard error.[178] This, in turn, resulted in a much more efficient operation reducing the need for costly resources from both a patient and provider perspectives.

SOF CA elements must learn the relevant lessons this case provides. Despite enduring missions to the same locations in a persistent engagement capacity, the relationships between relevant variables within operational environments have yet to be critically assessed using these statistical analyses and modeling techniques.[179] As battlefields become more complex, uncertain, population-centric endeavors, the Army and Joint Force will require a much more contextual understanding of the operational environment distilled into insights they can use to focus their investments and apply their resources. Krohley agrees with this assessment arguing the objective for CA is to reduce the complexity and uncertainty associated with the civil component of the operational environment.[180] Thus far, the U.S. track record for fighting insurgencies is inconclusive.[181] It has not adapted its forces well, however, to the complex challenges associated with the nuances and differences of the adversaries. SOF CA's reporting and analysis capabilities focus on both threat reporting to enable kinetic strikes, in lieu of concentrating its resources on the socio-political structures supporting transnational terrorist organization and violent extremist organizations. SOF CA produces a significant volume of information of limited value because it requires it consumers to conduct their

---

[177] Gladwell, *Blink*, 103–4.

[178] Daniel Kahneman, *Thinking, Fast and Slow* (New York, NY: Farrar, Straus, and Giroux, 2013), 224.

[179] Department of the Army, *Civil Military Engagement*.

[180] Krohley, "Integrating Civil Affairs."

[181] McFate, *The New Rules of War*, 1–9; Blanken and Lepore, "Principals, Agents, and Assessment."

own analysis and determine its relevance.[182] The evidence that partners undervalue its information should be enough to require CA to critically assess its analytical capabilities and the potential utility of incorporating data science and analysis techniques. This would provide actionable insights into targeting frameworks and strategy development.[183] It seems that U.S. planners have missed the entire point of their COIN strategy, the challenges of COIN are principally politically motivated and require progress in the social and political domains. Consequently, accurate assessments of socio-political entities are essential to achieving U.S. political-military goals.[184]

E.   ANALYSIS OF THE CASES

Gentlemen, we have run out of money so now we have to think.

—Sir Winston Churchill[185]

1.   Elements of Successful Analytical Processes

In the modern context, many associate data-driven and evidence-based approaches with those utilized by Facebook, Amazon, Netflix, or Google (FANG) leveraging big data, and sophisticated machine learning algorithms and artificial intelligence. But this would be a misconception. The scale and sophistication of the FANG operational frameworks are unique to their business model.[186] In contrast, each case illustrates the point that an innovative organization can leverage moderately sophisticated statistical analysis to gain unique insights into their environment. Yet, this is one of two components. Further evaluation reveals another critical aspect of their success: the integration of these insights into both operational and strategic approaches of the organization. For example, the

---

[182] Zachary Shore, *Blunder: Why Smart People Make Bad Decisions* (New York, NY: Bloomsbury, 2008), 141.

[183] Flynn, Pottinger, and Batchelor, *Fixing Intel*, 1–7.

[184] Galula, *Counterinsurgency Warfare: Theory and Practice*, 4–5.

[185] Roger Z. George and James B. Bruce, "Conclusion: Professionalizing Intelligence Analysis in the Twenty-First Century," in *Analyzing Intelligence: National Security Practitioners' Perspectives*, Second edition (Washington, DC: Georgetown University Press, 2014), 337.

[186] Chase Davis, "Using Big Data to Ask Big Questions," OpenNews, October 4, 2013, https://source.opennews.org/articles/using-big-data-ask-big-questions/.

Oakland A's found that bunting did not correlate to scoring runs or winning games, so they ceased bunting.[187] From a strategic standpoint, the Oakland A's determined recruiting players from college was more profitable because they had more performance statistics against higher-quality competition.[188] The A's realized they were investing too much in a player's potential and neglecting a player's performance, which was more indicative of future performance. The process appears basic, but it distills the basic elements of what organizations must do to be successful, especially in complex and turbulent environments that Blanken and Overbaugh define as an *adhocracy*.[189] They argue organizations must do the following:

1. Develop actionable insights.

2. Integrate these insights into operations and strategy.

These fundamental elements define the purpose of any analytical process relating to statistics. Krohley emphasizes these point in his article, "Integrating Civil Affairs – An Outsider's Perspective," and he defines the entire purpose of CAA in support of the Army and Joint Force.[190] Krohley argues that CA must focus on generating actionable insights and, subsequently, integrate these actionable insights into operational targeting frameworks and strategy development. This is a stark contrast to CA's current understanding of their role and function within their CIM process, which conflates volume with value. While useful in certain respects, Gladwell points out in *Blink* that less is more when it comes to information in certain circumstances. The case study of Brendan Reilly and the Cook County Hospital study of heart attack assessment protocols reduced the

---

[187] Lewis, *Moneyball*, 153.

[188] Lewis, 99.

[189] An *adhocracy* is an operating environment characterized as turbulent and complex. Blanken and Overbaugh describe adhocracy as "the most challenging environment in which an organization might exist" like "organization [s] must identify new challenges, devise innovative solutions, and be prepared to do so over again as the external situation evolves." They use the example of advanced research-and-design programs as an example of a profession operating in such an environment. Blanken and Overbaugh, "Looking for Intel?," 564–65.

[190] Krohley, "Integrating Civil Affairs."

amount of resources consumed by patients suffering from symptoms of heart attacks by reducing the complexity of the physicians' assessment process to four variables which most correlated with the immediate onset of heart attacks.[191]

2. Elements of Analytical Process Failure

All of the cases highlight instances where the process worked correctly, while efforts of other organizations such as General Electric (GE) and Proctor & Gamble (P&G), eager to replicate the success of these cases, have largely failed.[192] Davenport and Westerman provide context on why these company transformations to data-driven models failed.[193] They attribute the failures of GE, P&G, Ford, Sears, and Zynga to four factors. First, they attribute the failures to a focus on transitioning to a digital architecture at the expense of the other aspects of their operations. They suggest no digital transformation should be viewed as a panacea. Second, Davenport and Westerman argue that companies underestimate the resources required to sustain these initiatives, which can be a drain on a company's resources in other areas if the return on investment is not immediate or nonexistent. Third, they point out the importance of considering the readiness for innovation adoption from both a competitor and a customer perspective. Lastly, they reveal the allure of a new business model is always strong when other aspects of the business are not performing well. They suggest these prospects for change are overemphasized as they tend to be associated with such purported panaceas.

Perhaps the best example of analytical failure for CA to learn from comes coincidentally from the same chapter as the Brendan Reilly and the Cook County Hospital's case in *Blink*, where Gladwell discusses a Joint Forces Command Exercise in

---

[191] Gladwell, *Blink*, 101–3.

[192] Randy Bean and Thomas H. Davenport, "Companies Are Failing in Their Efforts to Become Data-Driven," *Harvard Business Review*, February 5, 2019, https://hbr.org/2019/02/companies-are-failing-in-their-efforts-to-become-data-driven; Thomas H. Davenport and George Westerman, "Why So Many High-Profile Digital Transformations Fail," *Harvard Business Review*, March 9, 2018, https://hbr.org/2018/03/why-so-many-high-profile-digital-transformations-fail.

[193] Davenport and Westerman, "Why So Many High-Profile Digital Transformations Fail."

2002 known as the Millennium Challenge.[194] Gladwell examines Colonel Paul Van Riper and his red team, comprised of stockbrokers, defending their notional autocracy from U.S. Forces and its new Operational Net Assessment (ONA) tool and Effects-Based Operations (EBO) concept, which assumed U.S. forces had near omniscience of the battlefield. The goal of the Joint Forces Command exercise was to determine how U.S. planners and decisionmakers could leverage these new tools to fight a rogue dictator threatening the Persian Gulf region securing victory without the wanton destruction of wars past.[195] Gladwell noted that ONA and EBO promised the U.S. coercive power through the combination of deep analysis and manipulation of the diplomatic, informational, military, and economic elements of national power.[196] Nevertheless, the volume of information and the need for constant analysis overwhelmed the staff of U.S. Forces and resulted in information overload and abysmal failure. Gladwell noted that Colonel Van Riper and his red team destroyed a U.S. Navy Carrier Group and repelled the invasion force twice after resets to the exercise due to the added complexity of using the ONA tool.

These passages illustrate the point that too much information can be counterproductive without the proper analysis to determine what information is relevant. This is one reason that General James Mattis ended EBO.[197] Unfortunately, CA forces never fully invested in this type of analysis, instead opting to delegate this task to other parties such as military intelligence or relying on technology-enabled analysis tools like Palantir to show trends and commonalities between relationships of interest. While useful to the U.S. Army and the SOF community and its systems, these techniques adopted an unscientific, subjective approaches without mechanisms to test either the veracity of its conclusions or success of CA's subsequent actions. It is the equivalent of Archie Cochrane's argument that without testing U.S. operations, there is no way to know if they

---

[194] Gladwell, *Blink*, 79–112.

[195] Joint Forces Command, *U.S. Joint Forces Command Millennium Challenge 2002: Experimental Report* (Norfolk, VA: Joint Forces Command, 2002), 139–399.

[196] Gladwell, *Blink*, 83–111.

[197] James N. Mattis, "USJFCOM Commander's Guidance for Effects-Based Operations," *Parameters*, no. Autumn 2008 (2008): 18–25.

were effective against irregular threats. These are the analytic techniques and perspectives that must be changed or at a minimum evaluated critically and scientifically, lest CA forces choose to maintain its illusion of insight.

3.   Organizational Change Management and Innovation

Despite the diversity of cases, they share many common elements that improved the overall performance of the organization. In analyzing the common elements, each organization conducted the following:

- Adapted out of necessity.

- Generated new knowledge in the form of insights.

- Reduced the complexity of their environment.

- Developed a common understanding of the problem.

- Committed to the organizational change.

- Elevated a sufficiently powerful champion to implement their innovation.

- Demonstrated a willingness to challenge conventional wisdom.

- Integrated their insights into their operations and strategy approaches.

While each organization transitioned to a data-driven approach, innovation and change management were critical factors underlying their success. Organizational change was at the center of each case, and organizational change is no easy task. Each example demonstrates the pain organizations experience when confronted with implementing new business practices. The confrontations between Jack Maple and his Precinct Chiefs, Billy Beane and his scouting staff, Archie Cochrane and his medical colleagues, and Brendan Reilly and his ED staff all illustrate their organizational cultures' resistance to change. John P. Kotter, an authority on change management, prescribed an eight-stage process for implementing successful organizational changes. The eight stages he lists are as follows:

1. Establishing a Sense of Urgency

2. Creating the Guiding Coalition
3. Developing a Vision and Strategy
4. Communicating the Change Vision
5. Empowering Employees for Broad-Based Action
6. Generating Short-Term Wins
7. Consolidating Gains and Producing More Change
8. Anchoring New Approaches in the Culture[198]

These eight-stages mirrors the process flow each organization used to transition their organization to a data-driven organization. The NYPD, Oakland A's, National Health Service, and Cook County Hospital transitioned through each stage of Kotter's process.

All of the organizations possessed a sense of urgency because the problems they faced were essential to their survival. The champions in each of these cases had to create a guiding coalition to see their methods adopted. Jack Maple could not have changed the NYPD without the support from his Police Commissioner and Mayor. All of the actors had inter-disciplinary backgrounds and strong convictions to match their personalities. They viscerally communicated the vision. Jack Maple and Archie Cochrane were direct and abrasive in their confrontations, but in the end, the logic of their arguments persuaded others to support their ideas. Consequently, organizational change management contributed significantly to their success.

Each innovation had a disruptive impact on each of their industries. For example, most MLB teams adopted statistical modeling techniques following the Oakland A's lead, even teams with the strongest antithetical philosophies.[199] CompStat diffused across metropolitan areas all over the world, and RCTs and EBM became the standard in evaluating medicine and its effectiveness.[200] The work of Everett Rogers and Geoffrey Moore provides additional context to the success of these organizations and their

---

[198] John P. Kotter, *Leading Change*, Hardcover (Boston, Massachusetts: Harvard Business Review, 1996), 33–145.

[199] The Saint Louis Cardinals adopted a more data-driven approach following the Oakland A's run of success. Yet, much like the Oakland A's, they adopted a fusion methodology to complement their investments in scouting staff and player development programs for which they were well known. Silver, *The Signal and the Noise*, 87.

[200] Ratcliffe, *Intelligence-Led Policing*, 3; Tetlock and Gardner, *Superforecasting*, 29.

methods.[201] Rogers proposed that for innovations to be adopted and rapidly diffused, they needed to meet five criteria, later known as the Rogers Five Factors. These five factors are

1. Relative advantage—the degree to which a product is better than the product it replaces
2. Compatibility—the degree to which a product is consistent with existing values and experiences
3. Complexity—the degree to which a product is difficult to understand and use
4. Trialability—the degree to which a product may be experimented with on a limited basis
5. Observability—the degree to which a product usage and impact are visible to others[202]

Each of these innovations provided clear benefits across the five factors. For instance, CompStat and Cook County Hospital's algorithms provided a relative advantage in the promise of more efficient operations and more definitive conclusions. The statistical analysis involved in *Moneyball* was more sophisticated than determining whether patients recovered more effectively in cardiac care units or at home with bed rest, but the statistical methodology and rigor were similar. Lastly, the observability made the largest impact in MLB, New York City, and the efficacy of medicine. Critics and teams noticed the Oakland A's strange selection of players, sacrilegious in-game decisions in defiance of the conventional wisdom, and competitive record despite a limited budget. Meanwhile, the crime in New York City began to plunge due to increased enforcement of low-level crimes, and physicians tested the efficacy of their interventions curing their self-imposed blindness. The progress in all fronts was astonishing and prompted changes across their industries.

4. Insights for the Civil Affairs Branch

In the spirit of Sir Winston Churchill's quote at the beginning of the chapter, CA forces must reflect upon the past eighteen years in Afghanistan and consider the limits of its influence and resources. In fourteen of the eighteen years, U.S. appropriations greatly

---

[201] John T. Gourville, "Note on Innovation Diffusion: Rogers' Five Factors" (Cambridge, MA: Harvard Business School, April 17, 2006), 1–6.

[202] Gourville, 1–6.

exceeded the point of aid saturation to stabilize Afghanistan with little prospect for success.[203] Sopko contends most of the indicators found in the Special Inspector General for Afghanistan Reconstruction (SIGAR) suggest that U.S. efforts were counterproductive, contributing to greater corruption, instability, and conflict.[204] Thus, the United States and its CA forces must start looking at their operational environment differently if they expect to achieve different results.

The era of Great Power Competition (GPC) and the looming prospect of durable disorder will strain budgets and funding for influence operations. Therefore, CA forces must adopt the methods such as those employed in *Moneyball* to determine the relationships and correlation between variables in the operational environment such as significant activities, actors, information, locations, and operations. *Moneyball* provided an outline for CA forces to follow in finding the factors undervalued by the market. CA forces must begin assessing their activities such as investments in aid saturated capital regions in a meaningful way, or risk what Tetlock describes as "blind men arguing over the color of the rainbow."[205] Operating under the illusion of insight is no longer acceptable. While the population density in these capital regions is much higher, the preponderance of evidence suggests groups engaging in political violence operate well outside of these regions in isolated communities. Therefore, CA must begin to evaluate the relationships among variables while determining the efficacy and efficiency of their interventions as Archie Cochrane emphasized.[206] The analysis component is key, and adopting a data-driven approach is one way to study these relationships more effectively. CA forces require the methodologies and tools capable of delivering conclusions.

---

[203] The parameters associated with aid saturation vary between 15 and 45 percent of the recipient country's gross domestic product (GDP). In fourteen of eighteen years, the U.S. contributed more money in excess of 45 percent of Afghanistan's GDP. U.S. appropriations for Afghanistan surged passed 100 percent of Afghanistan's GDP in 2007 and 2010. John F. Sopko, "Afghanistan Reconstruction: Lessons from the Long War," *PRISM* 8, no. 2 (2019): 32–33.

[204] Sopko, "Afghanistan Reconstruction."

[205] Tetlock and Gardner, *Superforecasting*, 32.

[206] Tetlock and Gardner, 31–32.

Critical to CA's establishment of a data-driven effort is the focus on generating actionable insights and integrating these insights into U.S. operations and policies. These insights must reduce the complexity of the operational environment and use visualizations to expand the working memory of analysts and decisionmakers. This emphasis on analysis will alter the composition and function of CA organizations. Thus, there will be an organizational change component to accompany enhanced analytical capability. In *Leading Change*, Kotter provides the roadmap for establishing a data-driven, analytical capability using his eight-steps. Blanken and Overbaugh offer CA forces the requirements necessary to operate effectively in the future operating environment. Blanken and Overbaugh write:

> Members of the organization will need to be highly qualified and motivated, and be required to possess advanced and ongoing training and education. The management structure will need to be flexible and accommodating, both to dynamic external environment, as well as to its own members. The organization as a whole must identify new challenges, devise innovative solutions, and be prepared to do so over again as the external situation evolves.[207]

The personnel, organizational structures, training, flexibility, and sensitivity to threats within the environment would indicate this capability should reside in a SOF organization. Their description is reminiscent of the description Silver describes in his work *The Signal and Noise*, where statistically-prone professionals leave profitable hedge funds to work for an MLB team at a tenth of the wage.[208] Hence, CA forces should only select those with the motivation and aptitude for analytical work to be trained in this analytical activity. Of particular interest, CA forces should emulate these case studies and select internal innovators from within their formations rather than continue to abdicate this analytical responsibility.[209] CA forces possess unique experience and context within the Army and

---

[207] Blanken and Overbaugh, "Looking for Intel?," 565.

[208] Silver, *The Signal and the Noise*, 87.

[209] *Civil Affairs Operations* lists tasks military intelligence analysts as performing the analysis in conjunction with CA personnel. Upon further evaluation of the Table of Distribution and Allowances, the military intelligence analysts responsible for conducting the analysis lack the experience, context, and training to evaluate the civil component of the operational environment. Department of the Army, *Civil Affairs Operations*, 1–7; U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, "CA FMA."

Joint Force, as they are responsible for working to develop a diverse network of UAPs with which to collaborate and coordinate analytical activities.[210]

CompStat suggests another lesson to CA forces in the form of accountability and data. CA forces hold the mandate for civil reconnaissance and civil engagement to affirm or refute the validity of the information.[211] The lesson CompStat conveys is hidden within the process of holding Precinct Chiefs accountable for their lack of reporting the information required to align NYPD resources towards crime hotspots. What the story doesn't tell is that Jack Maple created a formal network, where the individual precincts were required to report their data to NYPD Headquarters daily. This enabled Jack Maple and his team to determine the scope of the crime epidemic facing the city for the first time. Before CompStat, crime went underreported, unacknowledged, and without data. It was impossible to determine the scope of the criminal activity in the city. In this situation, Seth McFate's comparison of *Alice in Wonderland* to the strategic atrophy of the United States seems appropriate, writing, "If you don't know where you are going, any road will get you there."[212] Only after the scope of the problem is ascertained, can one proceed to develop an appropriate plan to address the problem.

CA analysts face a similar task as did the NYPD in New York City. They must determine the scope of the problem confronting U.S. forces in the FOEs, particularly in the social and political domains. Yet, this task is impossible without the support of CA's interagency, unified action partners, and engagement with indigenous populations and institutions. Unfortunately, collaborating with interagency and UAP partners can be difficult due to the diversity of relationships, interests, and perspectives. The CA network is only as good as the strength of the relationships. Where CompStat held meetings to question the Precinct Chiefs about their responses, CA analysts should instead use this their collaborative opportunities to glean further insights into the civil component of the FOE

---

[210] Department of the Army, *Civil Affairs Operations*, 2–30.

[211] Department of the Army, 2–3, 3–17.

[212] McFate, *The New Rules of War*, 11.

and build a contextual understanding of the environment for their supported commanders and policymakers.[213]

One aspect not common to all of the case studies, yet equally relevant, is the adoption of a hybrid model that integrates the data-driven approaches to support its former intuitive approaches. The organization model used by the Oakland A's became the standard across baseball following the release of *Moneyball*. Despite Lewis's assertions that the data-driven model displaced the scouting model, the Oakland A's did not fire its scouting staff. On the contrary, the A's increased their budget and used their analytical process to evaluate players and support the decisions of their scouting staff. Silver notes that in a competition between his analytical system, PECOTA, against a scouting staff that the scouting staff would win.[214] He argues that PECOTA is susceptible to making false-positive predictions (Type I errors), where scouts are less susceptible to making these judgments. Silver is not the only advocate for using data-driven approaches to complement human intuition. He describes the prevailing approach as "Teams are increasingly using every tool at their disposal to make these decisions."[215] Prominent figures like Philip Tetlock, Daniel Kahneman, and Anne Milgram argue that any predictive analytic approach should utilize the strengths of both humans and machines.[216] They promote using algorithms that consistently outperform expert judgment in turbulent environments and expert intuition in more consistent environments.[217] Therefore, CA forces should begin to develop the models and algorithms to balance their current intuitive approaches. The only

---

[213] Susan H. Nelson, "Analytic Outreach: Pathway to Expertise Building and Professionalization," in *Analyzing Intelligence: National Security Practitioners' Perspectives*, Second edition (Washington, DC: Georgetown University Press, 2014), 321–25.

[214] PECOTA is an analytical system developed by Nate Silver to rank the quality of both established baseball players and prospective players in the minor leagues, college, and high school. It is a system similar to what the Oakland A's used to evaluate their prospects. Silver, *The Signal and the Noise*, 86–102, 106.

[215] Silver, 106.

[216] Tetlock and Gardner, *Superforecasting*, 257; Anne Milgram, *Why Smart Statistics Are the Key to Fighting Crime* (TED, 2014), https://www.youtube.com/watch?v=ZJNESMhIxQ0; Kahneman, *Thinking, Fast and Slow*, 224.

[217] Kahneman, *Thinking, Fast and Slow*, 185–224.

way to begin this task is to maximize human potential.[218] Blanken and Overbaugh promoted building a capability for the environment in which an organization is to operate.[219] As the FOE promises to be an adhocracy, the U.S. Army should begin with the provision of advanced education and training initiatives to support its required analytical capability. Fortunately, the U.S. Army's MDO concept and supporting CA future operating concept outline both these long-term investments as essential to the effort.

---

[218] United States Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, 20; U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*, 9; McFate, *The New Rules of War*, 51.

[219] Blanken and Overbaugh, "Looking for Intel?," 565–66.

IV. CIVIL AFFAIRS ANALYTICAL CAPABILITIES

Consistent with the flow of literature in previous sections, this chapter details the current methods CA forces use to generate insights and, subsequently, integrate these insights into operational planning and strategy development. CA forces generate insights from many sources, yet most of their insights are developed in their tactical capacities performing tasks such as civil reconnaissance and civil engagement.[220] Unfortunately, the amount of knowledge generated from CA analysts is limited. This paradigm may appear counterintuitive, but the two largest factors contributing to this reality are the analytical techniques prescribed in CA doctrine and the lack of analytical training available for CA analysts. Overreliance on systems designed for knowledge management and exploratory analysis, outsourcing civil analysis to analysts primarily trained in dynamic and lethal-targeting, and emphasis on the tactical operations over-analytical functions are other factors contributing to this deficiency. Yet these factors are derivative of the analytical methods prescribed and a lack of analytical training.[221] Consequently, the scope of this research is restricted to the analytical techniques and processes prescribed in CA doctrine, known as the Civil Information Management (CIM) process. This research evaluates the current doctrine, capabilities, and practices within the CA community as well as the capabilities proposed by CA Proponent to meet the needs of the FOE to determine if other capabilities or techniques are more suitable to the task.

A. CIVIL AFFAIRS DOCTRINE

Two documents direct the performance of CA analysis. The primary component of CA analysis is CIM. The CIM process is CA's all-encompassing process that dictates the management, analysis, and integration of data to support Army and joint planning

---

[220] Benjamin F. Ordiway, "Beyond Tacit Approval: Embracing Special Operations Civil Affairs Support to the Intelligence Information Report," *Small Wars Journal*, accessed November 18, 2019, https://smallwarsjournal.com/index.php/jrnl/art/beyond-tacit-approval-embracing-special-operations-civil-affairs-support-intelligence.

[221] Yager, "Setting the Civil Affairs Analytical Foundation."

functions. The U.S. Army's *Civil Affairs Civil Information Management* is considered the most authoritative document on CIM because its purpose is to define and standardize every component of the CIM process.[222] The second document*, Joint Civil Information Management User's Manual 2.0,* also known as the *JCIM User's Manual 2.0*, is a more detailed document developed by U.S. Special Operations Command (USSOCOM) for personnel assigned as Battalion Civil Information Management Chiefs, responsible for executing CIM's analytical, production, and integration functions.[223] USSOCOM created the *JCIM User's Manual 2.0* to mitigate systemic issues associated with the shortcomings within CA doctrine. Other documents such as *Field Manual 3-57: Civil Affairs Operations* and its joint equivalent *Joint Publication 3-57: Civil-Military Operations* provide overviews of CIM, but their primary focus is on the roles, responsibilities, capabilities, and composition of CA formations.[224] These documents comprise the corpus of CA doctrine and constitute the authority on all CAA including its analytical processes and functions.

B.   CIVIL INFORMATION MANAGEMENT

This section introduces Civil Information Management and answers the following questions:

1.   What is CIM?

2.   What is the purpose of CIM?

3.   What are the components of CIM?

The purpose of these questions is to develop an understanding of the CIM process and its analytical methodology.

---

[222] Department of the Army, Civil Affairs Civil Information Management.

[223] United States Special Operations Command, *JCIM User's Manual 2.0*.

[224] Department of the Army, *Civil Affairs Operations*; Office of the Joint Chiefs of Staff, *Civil-Military Operations*, Joint Publication 3-57 (Washington, DC: Office of the Joint Chiefs of Staff, 2018), https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_57.pdf?ver=2018-08-09-144002-597.

1. Definition

The *Joint Publication 3-57: Civil-Military Operations* defines CIM as the "process whereby data relating to the civil component of the operational environment is gathered, collated, processed, analyzed, and produced into information products, and disseminated."[225] The joint definition is accepted and used in all Army doctrine. CIM is a continuous, six-step process that is outlined in Figure 1.
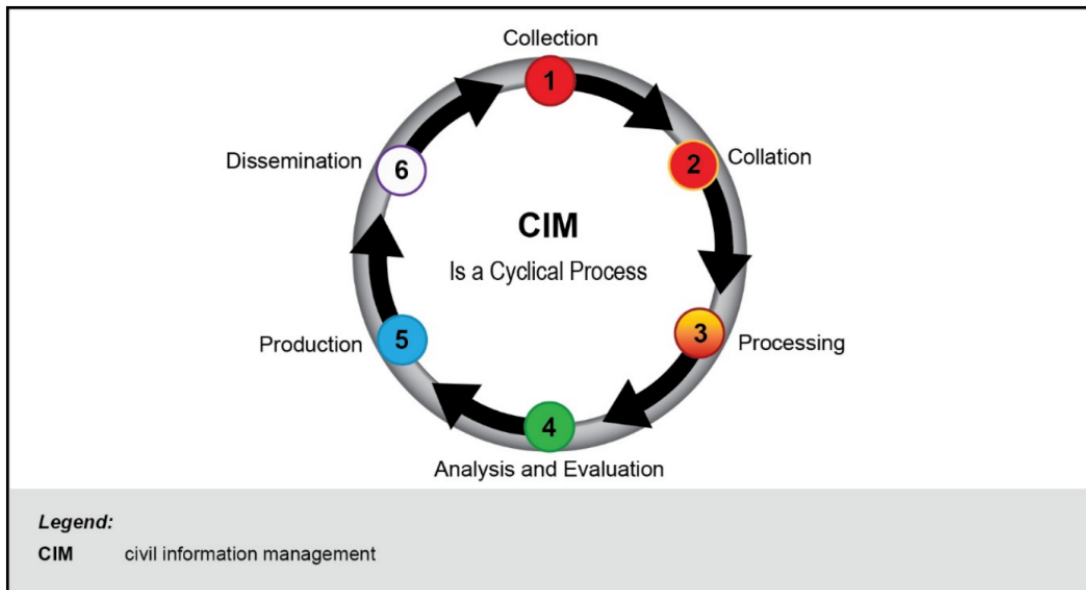
Figure 1.   The Civil Information Management Process[226]

---

[225] Office of the Joint Chiefs of Staff, *Civil-Military Operations*, GL-6.

[226] Source: Department of the Army, *Civil Affairs Operations*, 2-4, Figure 2-3.

2.   Purpose

The CIM Process is the primary analytical method CA analysts use to generate insights into the operational environment. The *Army Techniques Publication 3–57.50: Civil Affairs Civil Information Management* describes the primary purpose of CIM as, "to develop data that can be incorporated into the running estimate to help the commander and staff clearly understand the status of the civil environment within the OE."[227] More specifically, the CIM process supports the development of the following products:

- Joint Intelligence Preparation of the Environment (JIPOE)
- Common Operating Picture (COP)
- Centers of Gravity (COG) [228]

Civil Affairs Civil Information Management states these CIM outputs enhance "enhance situational understanding … and facilitate well-informed decision making."[229]

3.   Components of CIM

Figure 2, adapted from graphics in *Civil Affairs Civil Information Management*, provides a more detailed look at the individual steps of the process and the work associated with each step.[230] A description of each step also reveals the complexity of the tasks associated with the CIM process.

---

[227] Department of the Army, *Civil Affairs Civil Information Management*, 1-1.

[228] Department of the Army, 1–14; Office of the Joint Chiefs of Staff, *Civil-Military Operations*, C–3. Department of the Army, *Civil Affairs Civil Information Management*, 1–14; Office of the Joint Chiefs of Staff, *Civil-Military Operations*, C–3.

[229] Department of the Army, *Civil Affairs Civil Information Management*, 1-1.

[230] Department of the Army, 1-3–1-8.
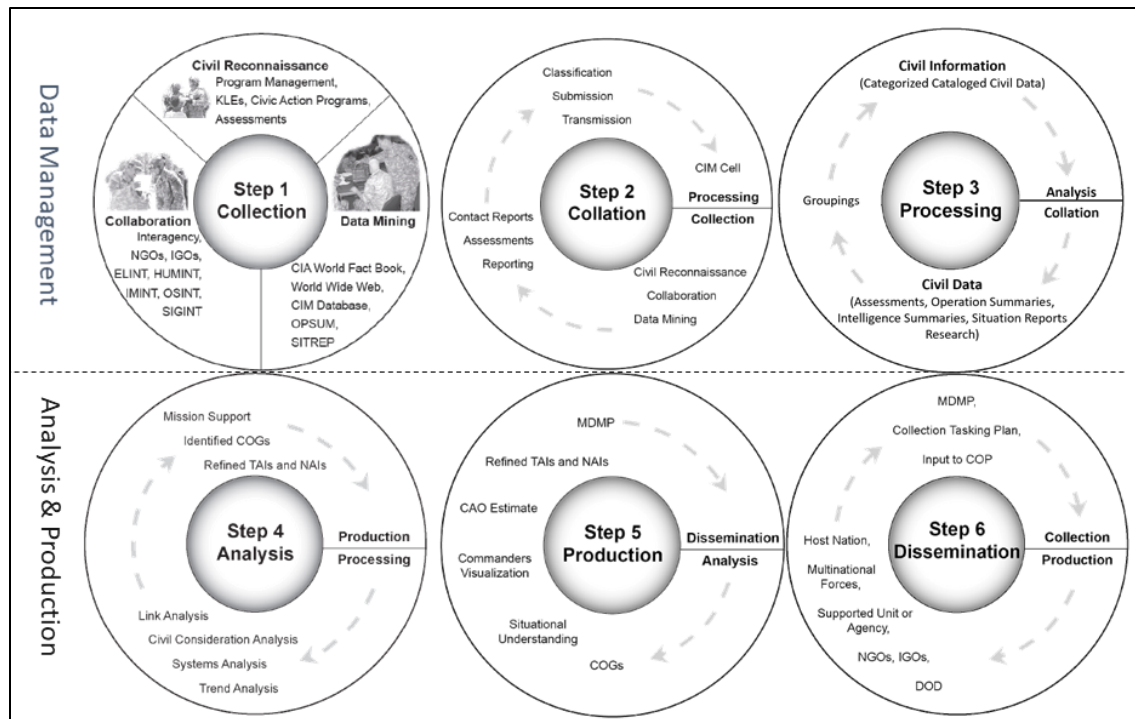
Figure 2.   The CIM Process Visualized[231]

Each step outlines how civil information is collected, organized, analyzed, and distributed throughout the supported headquarters, among interagency and UAPs, and integrated into the Army and joint planning processes. A short description of each step further defines the process.

a.   Step 1: Collection

The CIM Process starts with data collection. CA forces collect data using several methods. CAA such as civil reconnaissance, civil engagement, assessments, reports, civic action programs, and collaboration with UAP within the CA network represent a majority of the data collected by CA elements.[232] The other methods of data collection include data mining and intelligence reporting. Doctrine and other sources suggest that roughly 90

---

[231] Adapted from Department of the Army, 1-3-1–8., Figures 1-2, 1-3, 1-4, 1-5, 1-6, and 1-7.

[232] Department of the Army, 1-3-1–5.

percent of the civil information collected from open-source sources, which is consistent with the data collaboration with UAP.[233]

b.   *Step 2: Collation*

The second step of the CIM process is collation. It describes the process in which CA forces manage their civil information mainly through compiling raw data into a desirable format for transmission to parent organizations. The compilation includes classifying and filtering data into its appropriate medium, as well as grouping information into reports for dissemination throughout the CA reporting channels.[234]

c.   *Step 3: Processing*

The third step of the CIM process is processing. It describes the process of manipulating data into a useable form. The Department of the Army considers the processing step as, "information management, which is the science of using procedures and information systems to collect, process, store, display, disseminate, and protect knowledge products, data, and information."[235] After the data is processed, it is considered ready for analysis as civil information. This civil information is then used to update staff products, databases, or systems that enable analysis in the following step. Doctrine recommends maintaining databases and spreadsheets as methods for data storage and a way to keep data organized and available for future use.[236]

d.   *Step 4: Analysis*

The fourth step of the CIM process is analysis. The *Army Techniques Publication 3–57.50: Civil Affairs Civil Information Management* describes the analysis step as,

> sifting of information for patterns and indicators of past behaviors or ideas that might possess predictive value and application (Figure 1–5, page 1–6). Analysis molds information into a knowledge product. The most difficult

---

[233] Department of the Army, 3–7; Nelson, "Analytic Outreach," 322.

[234] Department of the Army, *Civil Affairs Civil Information Management*, 4-1-4–4.

[235] Department of the Army, 1–6.

[236] Department of the Army, paras. 5–13.

analysis performed uncovers the "unknown unknowns." Unknowns are indicators of future events previously obscured in the background data. CA Soldiers must direct analytical efforts to answer the unknowns in the COP rather than exhaustively refining known data. Analysis of civil information is similar to the normal enemy force-friendly force analysis process but instead focuses on—

- Identifying mission variables.
- Identifying operational variables.
- Identifying COGs.
- Identifying trends.
- Conducting predictive analysis.
- Identifying civil vulnerabilities.[237]

Analysis is a critical component because it supports the planning process. Doctrine emphasizes this point and covers critical thinking approaches, reasoning type, methods for forming a hypothesis and using the scientific method, bias, and recommends different forms of analysis.[238] *Civil Affairs Civil Information Management* recommends using the following forms of analysis to evaluate the operational environment:

- Civil considerations analysis—Civil considerations analysis is conducted in support of mission analysis based on the mission variables outlined in the memory aid METT-TC [mission, enemy, troops, terrain, time, and civil considerations. Civil considerations are further categorized as Areas, Structures, Capabilities, Organizations, People, and Events (ASCOPE)].
- Systems analysis—Systems analysis is conducted at operational levels and above to identify COGs based in the operational variables outlined in the memory aid PMESII-PT (political, military, economic, social, information, infrastructure, physical environment, and time).
- Nodal analysis—Nodal analysis is the study of the interrelationship of nodes … [with the intent to identify critical nodes] whose disruption or removal becomes a single trend analysis point failure.
- Link analysis—Link analysis illustrates the interrelationship of people, events, and locations through associations.
- Geospatial analysis—an analysis of geospatial information in relation to significant activity, events, actor, or characteristics (attributes) in relation

---

[237] Department of the Army, 1–5, 6-1-6–16.

[238] Department of the Army, 6-1-6–17.

to its location as represented on the earth's surface, on a map, or geospatial information system

- Trend analysis—Trend analysis identifies patterns and inclinations in data.[239]

e. Step 5: Production

The fifth step of the CIM process is production. Production focuses on the creation of civil information products easily understood by stakeholders. This civil information is produced in the form of "answers to requests for information, civil information for the common operating picture (COP), centers of gravity, civil considerations products, and updates to ongoing CAO assessments, area studies, or running estimates."[240] The products created include maps, link diagrams, reports, presentations, and briefing material.[241]

f. Step 6: Dissemination

The sixth, and final, step of the CIM process is dissemination. Dissemination focuses on delivering tailored products to meet the needs of civil information stakeholders. Examples include "integration into the COP, civil information repositories, reports, update briefs, or online databases."[242] Typically, the dissemination of civil information products is not limited to a supported headquarters because the CA network includes both interagency and unified action partners. Among these products are intergovernmental organizations (IGO), nongovernmental organizations (NGO), indigenous people and institutions (IPI), and actors from across civil society. Doctrine lists direct dissemination of products through distribution lists, granting access to systems, sharing with multinational and unified action partners' considerations, and updating the common operating picture as the preferred methods of dissemination.[243]

---

[239] *Army Techniques Publication 3–57.50: Civil Affairs Civil Information Management* presents nodal analysis as a blending of link analysis and systems analysis. Department of the Army, 6-4-6–6.

[240] Department of the Army, 1-6-1–7.

[241] Department of the Army, 7-1-7–4.

[242] Department of the Army, 1–7.

[243] Department of the Army, 8-1-8–3.

C. CIM COMPONENTS

The CIM process can be broken down into data management, and data analysis and production components. The data management component is focused on the collection, organization, packaging, and transmission of information from the tactical units to the CIM Cell responsible for the higher-level analysis. Organizing, manipulating, and integrating a prolific volume of reports, assessments, and contact reports are at times difficult to manage, depending on the volume and complexity of the information involved in the first three steps of the CIM process. The complexity of information will also vary depending on the preferred analytical technique applied in the analysis step. The complexity of the analytical method chosen will determine the intensity of the data processing effort. These steps are essential in setting the foundation for data analysis. "Garbage in, garbage out" is an axiom in many data analysis communities and alludes to the fact that any analytical function depends on the validity and reliability of the data and assumptions supporting it. For this purpose, academics and researchers consistently limit their research to only the most reliable, accurate, and reputable data sources available. The first three steps of the CIM Process encompass this data management component and they are crucial to data analysis.

The data analysis and production component in CIM steps four through six focus on the synthesis, interpretation, communication, and integration of civil information. While each step of the CIM process is essential, this research focuses on the analysis step of the CIM process because it dictates how all of the other steps are organized and executed. In other words, the types of analysis an analyst selects will determine what information is gathered and how the information will be coded and manipulated to meet the geospatial, relational, lexical, or temporal analysis requirements. Furthermore, an analyst's selection of an analytical method also determines the types of conclusions and products needed to communicate their insights. For these reasons, this research considers the analysis step the most important step within the CIM Process.

Where these steps are significant and relevant, the focus of this research is on the analytical methods employed once the data reaches the CIM Cell. It evaluates the analytical methods employed by CA analysts. There are significant implications attributed to how data is collected and managed, as in the earlier cases of *Moneyball* and CompStat, yet the

analytical methods employed by the CIM Cell will dictate how subordinate CA forces collect and manage their data. For example, if relational data is used, then the data collection will differ depending on whether CA analysts use Social Network Analysis or Link Analysis techniques. Since each method relies on different assumptions. Thus, the information requirements for CA elements change depending on the analytical methods employed.

The majority of CA products (outputs) such as reports, staff products, and briefings support formal U.S. Army or Joint doctrinal planning processes as inputs. These formal planning processes are the Military Decision-Making Process (MDMP) or Joint Operations Planning Process (JOPP). Therefore, Army and joint planning information requirements dictate the questions driving the selection of analytical techniques. CA analysis is only as good as the questions its leadership asks and the analytical techniques at its disposal. Thus, the limitations consist of the quality of questions, supported commanders, other stakeholders, and CA analysts who ask about their OE, as well as types of analytical methods at the CIM Cell's disposal.

D.   DATA AND REPORTING MEDIA

The majority of data supporting the analytical functions of the CIM process come from tactical CA elements and their headquarters element in the form of a Regional Civil Military Support Element (RCMSE) or Civil Military Operations Center (CMOC). Data comes in the form of situation reports (SITREP), operational summaries (OPSUM), contact reports (CONREP), key leader engagement (KLE) worksheets, assessments of infrastructure, and storyboards (SB). All CIM products are descriptive in nature and reported in a narrative form. All post-mission products are prepared in Microsoft Word, PowerPoint, or Excel. Depending on the element and their deployed capabilities, some CA elements provide shapefiles and database files with vector data representing points of interest in their OE, plotted during their operations. These reports and media comprise the civil information inputs used by a particular CIM analysis step.

E.   ANALYTICAL TECHNIQUES RECOMMENDED IN DOCTRINE

There are a variety of analysis techniques recommended in CA doctrine. *Civil Affairs Civil Information Management* recommends using six different forms of analysis supported by other associative and analytical tools to support these techniques.[244] These recommended forms of analysis can be categorized as geospatial, relational, and temporal. This section will consolidate what doctrine attempts to communicate.

1.   Civil Considerations Analysis and Systems Analysis

Civil considerations analysis and systems analysis must be combined under systems analysis. While these analyses are conducted separately and independently to support Army and joint planning frameworks, CA elements combine these two analyses into a targeted approach known as the PMESII-PT/ASCOPE Crosswalk which categorizes information into components where the civil considerations and operational variables overlap. The synthesis of these techniques forms a framework used to identify vulnerabilities within the civil component. The synthesis also comprises a critical component of determining the COGs. The PMESII-PT/ASCOPE Crosswalk is depicted in Figure 3. This framework uses the vulnerabilities identified in the analysis to determine the root cause of instability or conflict.

---

[244] Department of the Army, 6-1-7–3.

PMESII-PT › ASCOPE:	Political	Military	Economic	Social	Infrastructure	Information	Physical Environment	Time
Areas	Political Areas	Military Areas	Economic Areas	Social Areas	Infrastructure Areas	Information Areas	Physical Environment Areas	Time Areas
Structures	Political Structures	Military Structures	Economic Structures	Social Structures	Infrastructure Structures	Information Structures	Physical Environment Structures	Time Structures
Capabilities	Political Capabilities	Military Capabilities	Economic Capabilities	Social Capabilities	Infrastructure Capabilities	Information Capabilities	Physical Environment Capabilities	Time Capabilities
Organizations	Political Organizations	Military Organizations	Economic Organizations	Social Organizations	Infrastructure Organizations	Information Organizations	Physical Environment Organizations	Time Organizations
People	Political People	Military People	Economic People	Social People	Infrastructure People	Information People	Physical Environment People	Time People
Events	Political Events	Military Events	Economic Events	Social Events	Infrastructure Events	Information Events	Physical Environment Events	Time Events

Figure 3.   PMESII-PT/ASCOPE Crosswalk[245]

The process continues using the Interagency Conflict Assessment Framework (ICAF), Tactical Conflict Assessment and Planning Framework (TCAPF), or District Stability Framework (DSF) to identify root causes of local conflict using cultural and perception data, in addition to evaluating sources of both stability (resiliencies) and instability (triggers). The ICAF and DSF act as Structured Analytic Techniques (SAT), which add rigor, transparency of assumptions, and guide judgments towards more objective ends.[246] Figure 4 is a representation of the TCAPF, which is an adaptation of the ICAF and DSF.

Following these analyses, the CA element complete the process using systems analysis to determine the local COG, analyzing critical capabilities, critical requirements, and critical vulnerabilities. These analytical processes are used to determine where CA elements should focus their efforts and have the greatest impact on reducing the drivers of instability and conflict.

---

[245] Source: Department of the Army, *Civil Military Engagement*, 5–14., Figure 5-14.

[246] Randolph H. Pherson and Richards J. Heuer Jr., "Structured Analytic Techniques: A New Approach to Analysis," in *Analyzing Intelligence: National Security Practitioners' Perspectives*, Second edition (Washington, DC: Georgetown University Press, 2014), 231–48.

	Analysis					Design		
Source of Instability	Causes (Perception)	Causes (Systemic)	Objective	Impact Indicators	Impact Indicator Data Sources	Activities	Output Indicators	Output Indicator Sources
Lack of water. Food shortage.	We need more wells. We need more water for our crops. No food.	Increasing population. Tribal competition prevents people from cooperating. Water table could be dropping.						
TCAPF	**TCAPF**	**Task**	**Objective**	**MOE**	**Sources**		**MOP**	**Task**
Legend MOE measure of effectiveness MOP measure of performance TCAPF tactical conflict assessment and planning framework								

Figure 4.   Tactical Conflict Assessment and Planning Framework[247]

2.   Link Analysis

Link analysis is an important form of relational analysis that visualizes the relationships and associations between actors, organizations, places, and things. CA doctrine defines link analysis as the following:

> Link analysis is the process of identifying and analyzing relationships between personnel, contacts, associations, events, activities, organizations, and networks to determine key or significant links. CIM analysts use link analysis to determine who is involved with whom and how they are involved. Link analysis tools include association matrices, activity matrices, and link diagrams.[248]

Doctrine recommends developing link diagram charts using association matrices and activities matrices. These matrices are important because they highlight associations between relevant actors and events. and when combined into a link diagram, display links to visually form a more contextual and intuitive understanding of the interrelationships

---

[247] Source: Department of the Army, *Civil Affairs Civil Information Management*, 6–8., Figure 6-3.

[248] Department of the Army, 6–7.

between relevant factors. Figures 5 is a representation of a diagram that relates to actors, organizations, events, locations, and physical objects.
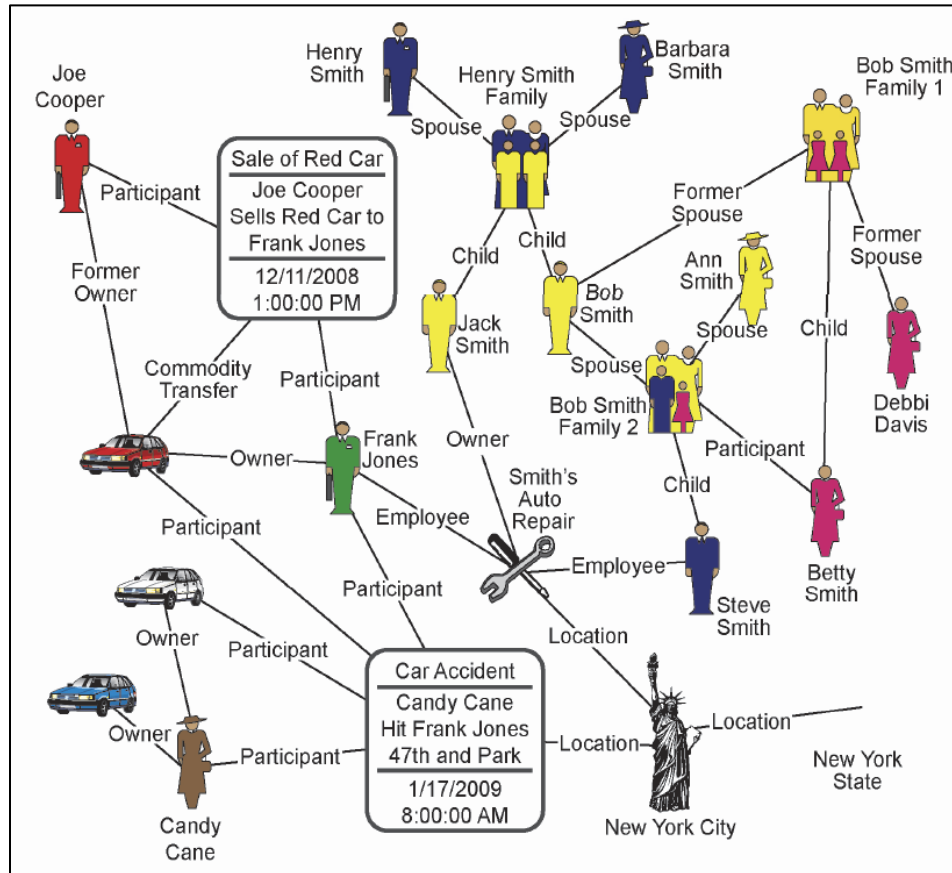
CA doctrine suggests, "Entities are linked together through associations, locations, and events. This offers the greatest potential for further analysis. When individuals are only linked to individuals, the only association they have to the rest of the link chart is through another person, failing to link the entity by membership in a group or an association with another entity or an event." [249]

Figure 5.   Link Diagram[250]

[249] Department of the Army, 6–11.

[250] Source: Department of the Army, 6–11., Figure 6-7.

3.   Nodal Analysis

The purpose of nodal analysis is to synthesize systems analysis and link analysis. Within CA doctrine, *Army Techniques Publication 3–57.50: Civil Affairs Civil Information Management* defines nodal analysis as the following:

> Nodal analysis reveals the interrelationship between people, organizations, entities, and locations. The individual nodes represent complex relationships between a person, place, or physical thing that are a fundamental component of a system and link the behavioral, physical, or functional relationships between the nodes. Critical nodes are those identified as being essential and whose disruption or removal becomes a single trend analysis point failure.[251]

Figure 6 is a depiction of a nodal analysis visualization. Nodal analysis is similar to the PMESII-PT/ASCOPE because it compares relevant areas, actors, and organizations across the operational variables. More importantly, it displays centers of gravity and their relationships to their supporting structures. These supporting structures defined as the interrelationships between actors, places, or things that determine which nodes require disruption, destruction, or support.

---

[251] Department of the Army, 6-7-6–9.
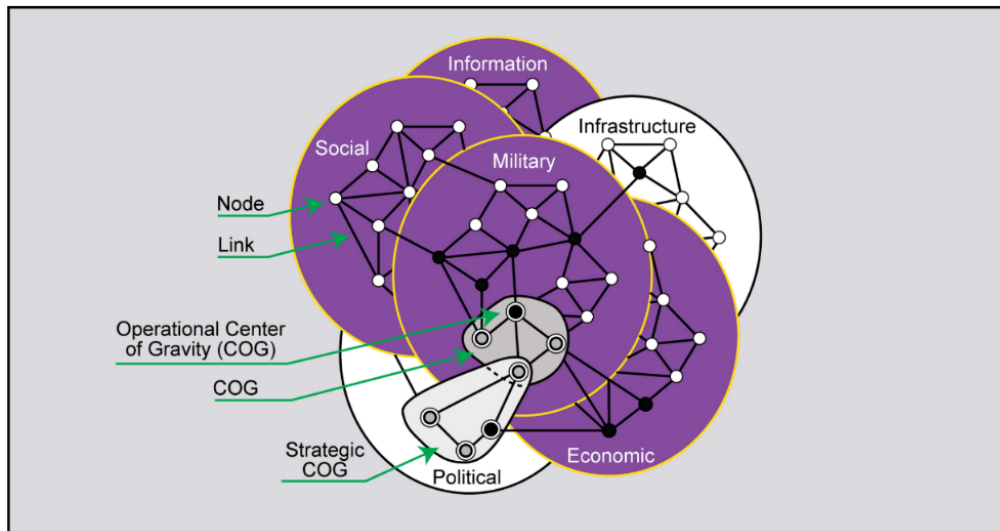
The nodal analysis representation commonly found in CA doctrine. This representation is useful to CA analysts for several reasons. One of the most important reasons is its display of the operational environment as more than a military problem and any solutions will require effort in other domains. The fusion of link analysis and systems analysis is useful communicating the importance of relationships across the operational variables.

Figure 6.   Nodal Analysis Representation[252]

4.   Geospatial Analysis

CA doctrine recommends using geospatial analysis to support the commander's visualization of the operating environment. It defines geospatial analysis as

> analyzing imagery and geospatial information to describe, assess, and visually depict physical features and geographically referenced activities that are of interest to the supported commander. Geospatial analysis produces imagery-based products and geospatial information in a GIS common to the entire DOD that is designed to capture, store, manipulate, and manage all types of geographically referenced data.[253]

CA doctrine defines geospatial information as

> analyzing imagery and geospatial information to describe, assess, and visually depict physical features and geographically referenced activities that are of interest to the support commander. Geospatial analysis produces

---

[252] Source: Department of the Army, *Civil Military Engagement*, 5–33., Figure 5-13.

[253] Department of the Army, *Civil Affairs Civil Information Management*, 6–12. Department of the Army, 6–12.

imagery-based products and geospatial information in a GIS common to the entire DOD that is designed to capture, store, manipulate, and manage all types of geographically referenced data.[254]

Geospatial analysis is important for three reasons. First, it provides the foundation for creating a COP, which helps the supported commander visualize the relevant aspects of the civil component. Second, geospatial analysis shows the complex interrelationships between operational variables and civil considerations identified in the PMESII-PT/ ASCOPE synthesis. Finally, geospatial analysis is important because it adds context when fused with other analytical methods. Hence, it has relevance in support of other products and staff planning processes. Figure 7 depicts this last point in a geospatial analysis of the civil considerations.
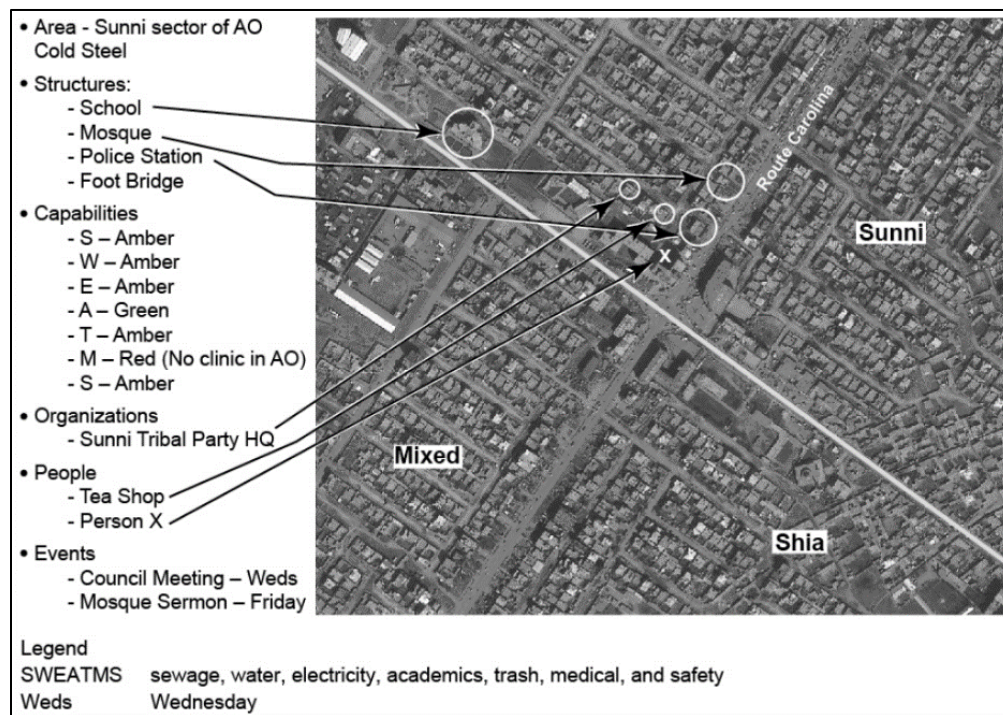
Figure 7.   Geospatial Analysis and Civil Considerations Overlay[255]

---

[254] Department of the Army, *Civil Affairs Civil Information Management*, 6–12.

[255] Source: Department of the Army, 6–13., Figure 6–8

5.   Trend Analysis

Trend analysis focuses on the temporal component of the civil component and the operational environment. It links actors, groups, organizations, events, and attributes in space and time. The primary purpose of trend analysis is to analyze relationships and patterns of events and behavior over time. Many systems of record use timelines, graphics, and wheels charts to identify trends.

F.   INTEGRATING FUNCTIONS

The CIM process identifies its integrating functions in its dissemination step. These integrating functions determine how civil information gets communicated to other staff sections and integrated into doctrinal planning processes.

1.   Doctrinal Outputs of CIM

The doctrinal outputs of CIM are the information products and inputs other staff functions require to develop plans and operations. These staff products differ in size, scope, complexity, and purpose, as necessary, to support specific staff information requirements and functions. These CIM outputs include the following:

- Common Operating Picture—Staff situational awareness tool that visually depicts the relevant aspects of the OE to support the supported commander's understanding of the civil component

- Civil Affairs Operations Estimate—Comprise of Area Studies, Civil Affairs Assessments, and Surveys

- Annex K and Annex G—Annexes to Operations and Execution Orders in Army (Annex K) and Joint Doctrine (Annex G)

- Annex V and Annex P—Interagency Coordination and Host-Nation Support Annexes to Operations and Execution Orders

The value of each CIM product diminishes as the information enters more formal planning processes because the civil information is stripped to suit relevant military information

purposes. For example, the COP and Civil Affairs Operations estimate will contain more context-rich information than the annexes.

2. Civil Information in Support of Targeting Frameworks

CA elements contribute to joint and dynamic targeting processes through its systems analysis outputs such as the identification of COGs, critical capabilities, requirements, and vulnerabilities. CA elements also contribute to the non-lethal targeting process in two ways. They recommend locations possessing critical infrastructure or capabilities for non-strike lists, and courses of action to influence specific targets using non-lethal means. CA planners participating in the joint targeting working groups and targeting boards play an important role in integrating civil information into operations and operational planning at each echelon.

3. Joint Intelligence Preparation of the Operational Environment (JIPOE)

The U.S. Army's Foreign Military Intelligence Collection Activity program plays a significant role in integrating relevant civil information into the broader intelligence community.[256] CIM is not an intelligence activity, yet military intelligence officers supporting CA units use debriefings of CA elements as a means of answering intelligence information requirements (IIR).[257] CA elements use IIRs are an informal metric used to internally assess the value and performance of CA elements, when properly supported with qualified military intelligence officials. This specific support integrates civil information relevant to the intelligence community into the human intelligence reporting systems for interagency distribution. Historically, this specific support is either sourced organically or sourced from military intelligence units supporting either the Theater Special Operations Command (TSOC) or Army Component Command (ACC). Anecdotal evidence suggests

---

[256] Samuel L. Hayes Jr., Daniel K. Chaves, and Christopher W. Tunning, "Operationalizing Civil Affairs' Value, CIM: Breaking Partner Silos to Illuminate and Shape Network Warfare" (PowerPoint, Commander's Initiatives Group, Fort Stewart, GA, November 2016); Rita Johnson, "IWTC Virginia Beach Foreign Military Intelligence Collection Activities Course Earns Joint Certification," *CHIPS*, January 19, 2019, https://www.doncio.navy.mil/CHIPS/ArticleDetails.aspx?ID=9936.

[257] Ordiway, "Beyond Tacit Approval."

that CA elements organically supported by specifically-trained military intelligence officers create more effective integration practices in the form of significantly increased IIR production. Thus, it seems that organic intelligence support provides more effective integration for the intelligence community and its interagency partners.

4.   Integration Value of Doctrinal Outputs

While the staff inputs provide a significant volume of information and rich context, the quality of the information degrades as inputs are entered into the standard formats needed for Army planning processes. Standing documents such as the Annex K and Annex G include lists, plans, orders, and narratives as information inputs. The purpose of these documents is to provide an informative overview including as much information as possible to support parallel planning processes. Visualizations of data are not typically embedded in these documents, yet civil affairs analysis products would be included in the appendices which adds significant value to these standard doctrinal products. Standard formats are necessary for efficient information consumption, planning, and subsequent analysis, but there is a cost associated with limiting the analysis to the production of doctrinal inputs. A reduced synthesized context that is difficult to explain and understand in a non-visual format may result.

The functional owner is also a factor in civil information value reduction. For example, CAA and products support both operations and intelligence staff functions. As such, the civil information disseminated supports their activity and priorities, which at times contrasts with CAA priorities pertaining to informational, social, and political domains. Military commanders are primarily concerned with the military and security issues underpinning their purpose and mission. Their secondary and tertiary priorities are often the focus of CAA. The systems analysis depicted in Figure 6 displays this point well. It shows the military component as one of many components interrelated in a complex problem. Unfortunately, this misalignment of priorities leads to a reduced understanding of the OE and suboptimal decision outcomes. CA elements recognize this fact and many times create separate products to meet and communicate their specific contextual needs.

G.   TECHNOLOGY-ENABLED ANALYSIS CAPABILITIES AND PROGRAMS OF RECORD

Technology-enabled analysis and programs of record streamline the two-step process of generating insights and integrating these insights by consolidating all of the tools and products into one digital environment. CA elements leverage a variety of technology-enabled analysis systems to store, analyze, produce, and distribute fused civil and threat information to its partners. These information systems enable more efficient collaboration, analysis, and fusion with consolidated access to a variety of analytical tools used to perform relational, geospatial, and temporal analysis. For example, Palantir includes analytical tools that function like Analyst Notebook and geospatial tools that operate similarly to Google Earth within in its Gotham and Gaia platforms. The development of private and shared workspaces for collaborations across staff functions with publishing capability makes it easy to disseminate information to a wide variety of interested partners.

In addition to the consolidation of analytical tools, these information systems use backend data science to create structured datasets from unstructured data. This functionality creates efficient data structures to facilitate data management and analysis with one significant downside. The backend transformations creating these data structures only exist to support the functionality of their system. To complicate matters further, most systems do not integrate data from other information systems, as they operate with different data structures. These information systems have different strengths and weaknesses and can be leveraged to support the specific needs of the Geographic Combatant Command (GCC) and component commands. Unfortunately, each GCC, TSOC, and component command have their preference, which makes the consolidation of data within information systems impossible.[258] Figure 8 highlights the variety of information systems used by CA units in different theaters.

Although not a complete list, the following systems comprise the majority of information systems and analytical environments used by CA analysts.

---

[258] United States Special Operations Command, *JCIM User's Manual 2.0*, iii.

- Palantir (Gotham and Gaia)

- Combined Information Data Network Exchange (CIDNE)

- International Distributed Unified Reporting Environment (INDURE)

- ArcGIS

- Protected Information Exchange (PiX)

- Defense Common Ground System (DCGS)

- Civil Information Management Data Processing System (CIMDPS)

- All Partners Access Network (APAN)

Of note, the preferences in systems differ based on the component supported. CA units supporting SOF elements use Palantir because it is the preferred platform of their supported unit. Equally, CIDNE and INDURE are used predominantly in Title 10 environments, or theaters engaged in armed conflict such as the United States Central Command.

Palantir and CIDNE serve a similar function as CA elements use both systems for reporting, analysis, and dissemination techniques. These two classified systems are the most widely used in the CA community.

ArcGIS is the most prominent government geospatial analysis system used by the geospatial engineers in the CA CIM Cells to support geospatial product development.

DCGS provided a common analytical platform for all Army units, however, Palantir emerged as a better analytical option to support SOF. As a result, Palantir is building the Army's new information system to meet their changing analytical needs.

PiX is an unclassified information system that hosts a team of open-source analysts with relevant regional experience capable of creating tailored geospatial and temporal products for their users. PiX also hosts collaborative environments to connect users with similar areas of interest.

CIMDPS is an information system evolved from its predecessor, the Civil Affairs Operations System (CAOS). Although developed specifically for CA forces, the system functioned as a repository with little analytical capability. As a result of the limited utility offered in the system, CA units looked to other systems to meet their analytical needs.

APAN is an unclassified platform, developed by the Office of the Secretary of Defense (OSD), used to collaborate with interagency, multinational, and IPI partners. There is no Common Access Card requirement, which makes it an attractive option for sharing information products with partners outside of the USG.
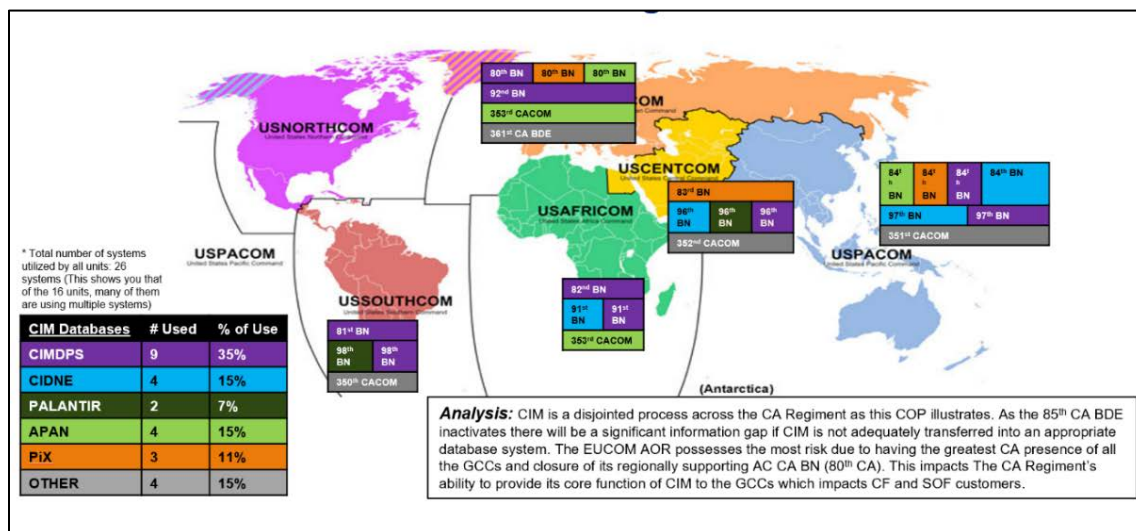
The USACAPOC CIM Cell created this CIM COP from a 2015 survey of all CA units to determine which information systems they used to meet their repository, analytical, production, and dissemination needs.

Figure 8.   Civil Information Management Common Operating Picture[259]

259 Source: United States Army Civil Affairs and Psychological Operations Command Civil Information Management Cell, "Civil Information Management COP" (PowerPoint, Civil Information Management Common Operating Picture Update, Fort Bragg, NC, July 2015).

H.   CIM OPERATIONAL CHALLENGES

There are several operational challenges associated with CIM. USSOCOM created the *Joint Civil Information Management User's Manual 2.0* to highlight these operational challenges and clarify the analytical techniques outlined in doctrine stating, "Each Service has experienced similar challenges when managing civil information and difficulty collaborating with civilian stakeholders without a standard methodology."[260] Operational challenges for all services and interagency partners include:

1. No common language defining the civil domain
1. No common reporting standards
2. No common graphic symbols
3. No common naming convention
4. No common data collection procedures
5. No common data storage procedures and standards
6. No interoperable systems for storing and transmitting civil information,
7. No common system for relief in place (RIP)/transfer of authority (TOA) data/information transfer
8. No common education or training for managing civil information[261]

The *JCIM User's Manual 2.0* highlights the effects of these challenges as:

> These challenges degrade the JFC's ability to achieve unity of effort among military, government, humanitarian assistance (HA), and development communities. Standardized TTP for collecting, consolidating, and sharing civil information mitigates some of these challenges and supports decision-making and unity of effort. The impact of these challenges on stakeholders in the operating environment includes:

1. Incomplete situational awareness of civil domain
2. Redundant efforts and wasted resources[262]

These operational challenges degrade the quality of civil information available to supported commanders. Incompatible systems and differing reporting standards are the results of poor data management functions that diminish the efficiency and effectiveness of analysis due to data availability and data quality. Fortunately, the CA community has

---

[260] United States Special Operations Command, *JCIM User's Manual 2.0*, iii.

[261] United States Special Operations Command, iii.

[262] United States Special Operations Command, iii.

mitigated or resolved many of these operational challenges. Unit Standard Operating procedures, doctrine, and systems are now streamlined to fit the component, TSOC, and GCC standards. USSOCOM published the *JCIM User's Manual 2.0* in an attempt to standardize CIM across CA formations in SOF, general purpose forces, and reserve component.[263] Expanded use of systems such as Palantir and CIDNE streamlined the CIM process and reduced the criticality of the naming conventions that were fundamental to functional CIM in the older systems. In other words, in systems capable of querying keywords across all reports in the system, it is less critical to organize the naming conventions in a manner to aid a user's search for relevant information. Therefore, while important for organizational purposes and internal functionality, naming conventions are less relevant in technology-enabled systems. Expanded use of Palantir and CIDNE also aided the data collection and storage procedures to meet the organizational requirements in the system. The transition to advanced technologically-enabled analysis systems mitigated most of the operational challenges associated with CIM.

I.   ANALYTIC CAPABILITIES FOR THE FUTURE OPERATING ENVIRONMENT

As discussed in the introduction and literature review, the consensus among security experts is clear in their perspective on the future operating environment. They argue that future operating environments promise to be more turbulent and complex, leaving traditional approaches unviable for producing outcomes favorable to the U.S. and its interests.[264] The U.S. Army's MDO and supporting CA future operating concept outlined in the *Civil Affairs: 2025 and Beyond* indicate the role of CA forces will expand as the preponderance of problems are linked to the shifts in human geography, governance, and the privatization of violence.[265] The changes in human geography encompass trending

---

[263] United States Special Operations Command, *JCIM User's Manual 2.0*.

[264] Office of the Joint Chiefs of Staff, *Joint Operating Environment 2035: The Joint Force in a Contested and Disordered World* (Washington, DC: Office of the Joint Chiefs of Staff, 2016), 4–6; U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*, 3–9; United States Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, i–iii.

[265] Office of the Joint Chiefs of Staff, *JOE 2035*, 4–6.

issues such as migration, demographics, and urbanization. State authority, legitimacy, identity, and polarization are forecasted to become governance issues in the future. The privatization of violence raises different concerns and contributes to the irregular warfare capabilities of U.S. adversaries and competitors. As these groups expand their influence and control under the threshold of armed conflict, they exploit the seams between civil and military problems. CA forces will require a greater understanding of their future operational environments to confront this growing threat and increase the likelihood of effectively and efficiently securing favorable outcomes. Thus, the predominant method of understanding is the concept of CIM and civil knowledge integration (CKI).

1.   Required Analytical Capabilities

In the *Civil Affairs: 2025 and Beyond*, the Civil Affairs Proponent outlines its components of the solution to challenges in the future operating environment.[266] One concept central to the solution is CKI. Figure 9 is a representation of the commander's intent and operating cycle of the proposed solution. It highlights the role of CKI in support of the CA operating concept. The CA Proponent highlighted several innovative analytical capabilities and bodies of knowledge, as needed, to "manage (process, evaluate, and track) domain-relevant civil information and actors over time. CA forces produce civil knowledge, integrate it with intelligence and other information, and effectively target the civil component through the development and employment of civil networks."[267]

---

[266] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*, 7–10.

[267] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, 7.

UNDERSTAND, ANTICIPATE, SHAPE, & EXPLOIT
THE CHANGING CONDITIONS OF HUMAN GEOGRAPHY

CIVIL KNOWLEDGE INTEGRATION

EMPLOY CIVIL NETWORKS

SHAPE	PREVENT	PREVAIL	CONSOLIDATE	SHAPE
INTEGRATE CIVIL & MILITARY SECURITY	COUNTER THREAT & PROXY NETWORKS	ENABLE MOVEMENT & MANEUVER	STABILIZE & TRANSITION	INTEGRATE CIVIL & MILITARY SECURITY

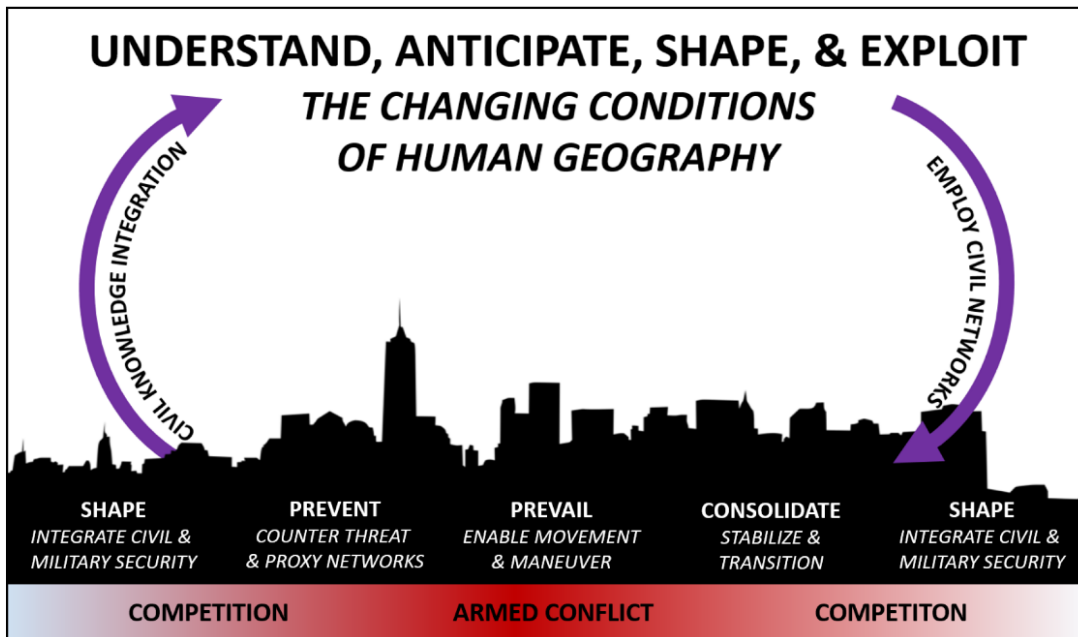| COMPETITION	ARMED CONFLICT	COMPETITON

Figure 9 is the visual depiction of the commander's intent for CA forces in and under the threshold of armed conflict. CA forces are tasked with continuously producing civil knowledge and integrating it with information from other sources to understand the civil component of the operational environment. Once understood, CA forces leverage their civil networks to support the activities necessary to secure favorable outcomes and return to competition.[268]

Figure 9.   Components of the Solution[269]

The Civil Affairs Proponent highlights the following analytical capabilities as being necessary to understand, anticipate, shape and exploit the human geography in FOEs:

- The CA force must be fully capable of persistent CR and CE across domains, to include cyberspace, and of building and maintaining a global lexicon of military-relevant local, regional, and transregional civil information and civil (political, economic, social, infrastructure, and information) networks.
- A future expanded practice of civil information management (CIM) applies civil expertise and predictive analysis to evaluate, model, and anticipate human geography, which includes the decision making of relevant actors.
- CA forces must combine social science, advanced analytical practices, and technology platforms to interpret civil information from complex datasets; identify networks, patterns, and critical information; and

---

[268] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, 7.

[269] Source: U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, 7. Figure 3-1.

project changing conditions in human geography. Examples of technology-enabled social analysis include predictive analysis, relational database management, spatial analysis, data mining, link analysis, content analysis, and sentiment analysis.

- Future CA technologies must be able to input and output in formats that are compatible with the Army's Common Operating Environment (COE) and Command Post Computing Environment (CPCE) currently being developed so that information can be mutually shared in a timely and efficient manner that facilitates rapid action and response.[270]

They go on to propose developing the following areas of expertise in future CA Soldiers:

- The CA Soldier's future as subject matter expert on all civil information across time and space requires a long-term investment with extensive training and education. The future CA Soldier must possess regionally relevant language and interpersonal capabilities to interface efficiently and effectively with the civil component.
- CA Soldiers require an effective understanding of political science, rule of law, public health, public administration, economics, and social anthropology to understand and effect change within the human geography.
- The future CA Soldier needs a professional working knowledge of information technology to efficiently navigate cyberspace and applicable programming.
- Future CA Soldiers apply descriptive and inferential statistics in order to effectively measure and evaluate civil trends and the effects of CAA.
- Future CA elements utilize technology-enabled research and analysis methods to effectively identify, evaluate, engage, and network relevant civil actors according to interests, functions, capabilities, and vulnerabilities (IFCV). Future CA forces navigate cyberspace to detect, analyze, develop, and employ social media and online civil networks to shape local, regional, and transregional information environments and leverage civic action.
- Future CAA form an integral part of unconventional warfare. CA forces are responsible for developing the civil component of resistance, to include its political legitimacy and governmental capabilities. CAA are critical to the consolidation of the gains of conventional and unconventional warfare, as well as the transition from civil unrest to stable governance and legitimate administration.[271]

---

[270] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, 7–9.

[271] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, 7–8.

This list of requirements is extensive. There are numerous references to expanding the analytical quotient of the force. Fusing these capabilities with technology-enabled research and analysis methods and expanded bodies of knowledge in anthropology and social science would improve the overall performance of the CAA, and subsequently the MDO formations they support.

2. Civil Affairs Force Modernization Assessment

The Civil Affairs Force Modernization Directorate is in the process of completing their first Civil Affairs Force Modernization Assessment (FMA).[272] This is a comprehensive effort to evaluate CA forces and the capabilities they require to support future MDO formations. This FMA identified a majority of the priority CA capability shortfalls from the functional needs assessment (FNA) fell within the CKI category. In fact, 31 of 126 capability gaps identified by the directorate during their FNA were former civil knowledge integration tasks.[273] Figure 10 shows the distribution of old core competency tasks.

First impressions note that the FNA identified more issues with the CAO and CMO mission command tasks, yet when further analyzed by priority the picture changes considerably. This number expands to 47 of 126 when former preparation of the environment tasks is included, which closely resembles the CKI tasks. These capability gaps exist across all echelons of CA elements including within the Brigade Combat Teams (BCT), component command, TSOCs, and Theater Civil Affairs Planning Teams (TCAPT). Of the tasks ranked as top priorities, 16 of 24 are civil knowledge integration tasks with severities of failure ranging from critical to catastrophic. The FMA Directorate team listed the probability of failure of all top priority tasks as frequent. Figure 11 displays the numbers when these categories of shortfalls are considered by priority. The graphic displays the number of old core competency tasks in the first two priorities. These results indicate that while mission command carries the majority of capability shortfall, the

---

[272] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, "CA FMA."

[273] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, 9–19.

priority of the needs resides with CKI, which highlights a clear need for stronger analytics and integrating processes.
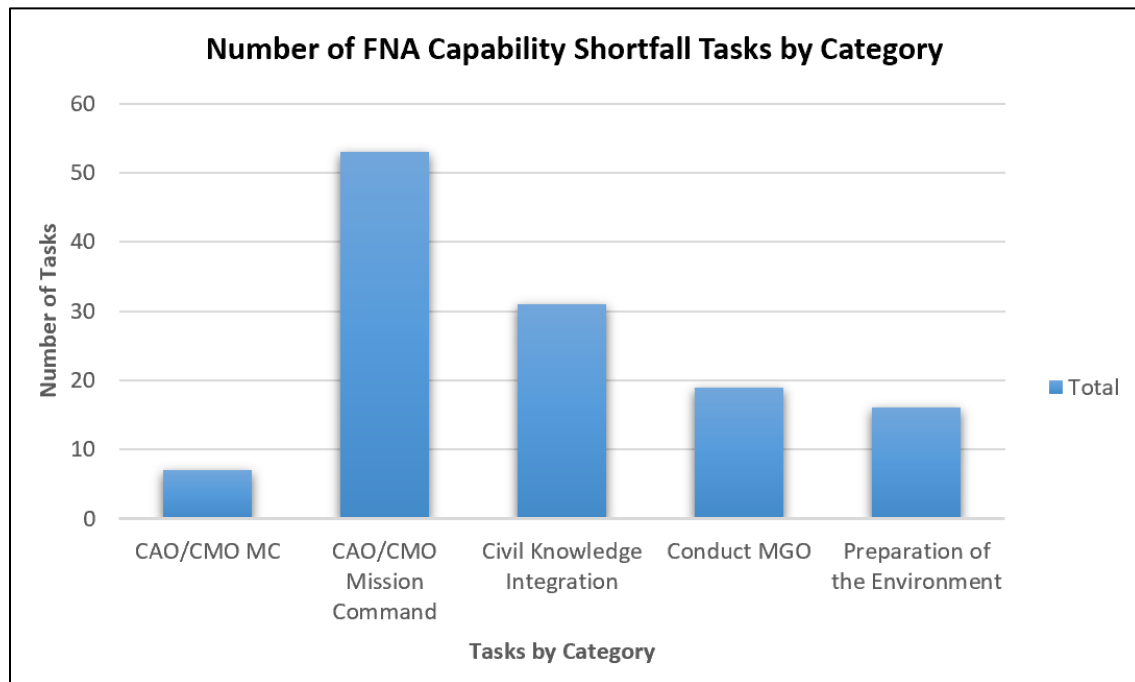
Figure 10.   Number of Functional Needs Assessment Capability Shortfall
Tasks by Core Competency Category[274]

The CA FMA also noted a need to expand the number of analysts and diverse skills to support organic CA formations at the company-level. They would be part of the Intelligence, Cyber, Electronic Warfare, Signal (ICEWS) formation within a Multi-Domain Task Force (MDTF). The intent is to add a robust capability to support CAA. Therefore, the CA Proponent's Force Modernization Directorate identified the lack of CA analysis capabilities and suggested that adding more horsepower in the form of organically grown support to the CA Company as a MDTF.

---

[274] Adapted from U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, "Civil Affairs Functional Needs Assessment" (Civil Affairs Modernization Assessment, Fort Bragg, NC, October 21, 2019).

Civil Affairs Functional Needs Assessment By Task and Priority Categories
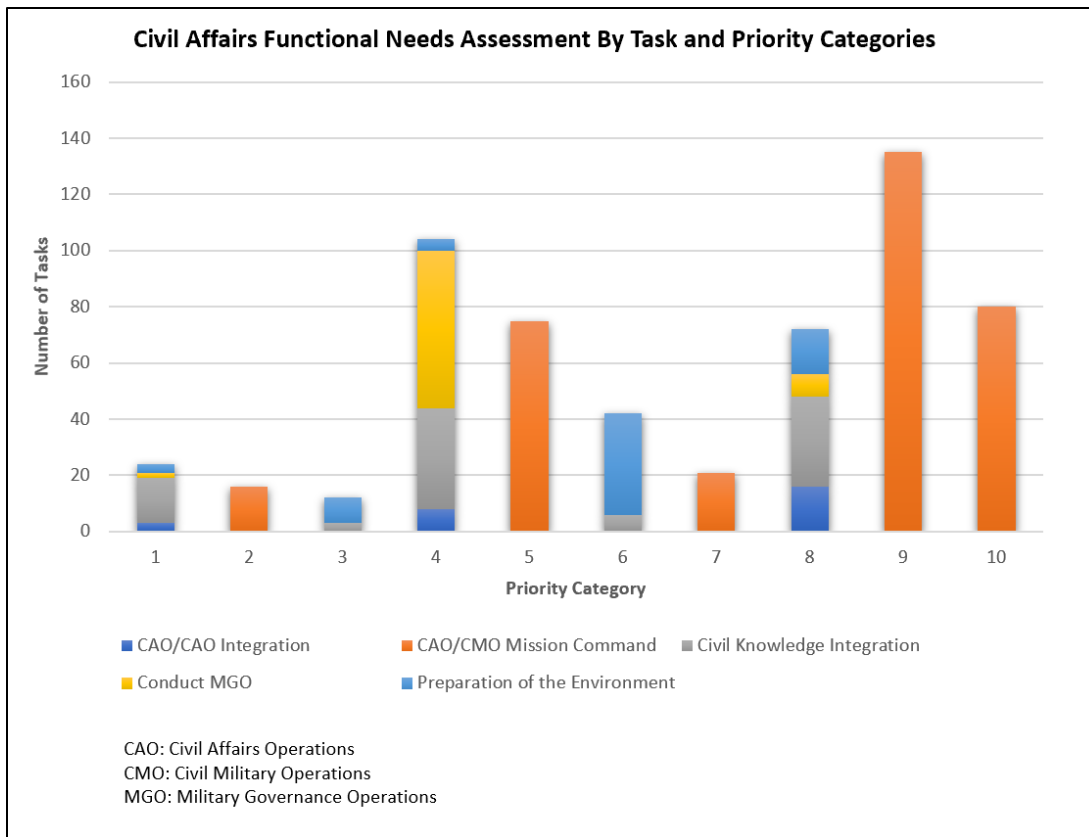
When the priority of needs in the FNA are considered, the results show the preponderance of critical needs rests with CKI. The failures associated with CKI are greater in severity than their CAO/CMO Mission Command tasks, which dominate priorities two and five. This shows that the Civil Affairs Proponent considers CKI their highest priority.

Figure 11.   Number of Capability Gaps by Core Competency and Priority[275]

J.   CRITICAL ANALYSIS

Previous sections in this chapter discussed the current and desired future analytical capabilities of CA forces to combat irregular threats in future operating environments. The effective and efficient integration of civil information and insights into both Army and joint planning processes will depend on CA's ability to execute CIM and CKI tasks. Currently, CIM is the primary analysis and integration function for CA elements to provide relevant civil information and analysis to their supported commander and network of partners. The assessment of relevant literature, case studies, doctrine, and force modernization plans

---

[275] Adapted from U.S. Army Special Operations Center of Excellence Civil Affairs Proponent.

reveal several prominent themes. The synthesis of these documents is important to understanding the way forward for CA analytical capabilities and pitfalls associated with those paths. There are consistent systemic issues present in CIM that undermine the strategic value position of the CA Branch, some of these need to be accepted as irrelevant if new methodologies are considered – others require attention in the form of investments in human potential. The battlefield has changed in character and dimensions. CA forces must adopt innovative analytical tools and frameworks to produce the insights necessary to inform both operational and strategic approaches that result in favorable outcomes for the U.S. and its allies.

1. Doctrine, Training, and Investment in Human Potential

The literature frames the problems associated with analyzing the civil component using the methods prescribed in CA doctrine. Liddick et al., Krohley, and Yager provide relevant criticisms of CA doctrine and its inadequacy in supporting advanced analytical functions.[276] Krohley provides the strategic purpose of CIM noting CA forces must focus their efforts towards developing insights into the socio-political networks supporting irregular threats, and integrating those insights into sophisticated targeting mechanisms designed to erode the threat's base of support.[277] These are strategic points that attribute U.S. failures in COIN environments to the U.S. forces' inability to analyze the civil component of the operational environment competently. There is ample evidence to support this conclusion, as Zachary Shore's offering in *A Sense of the Enemy*, Clark and Eddy's in *Warnings*, and Blanken et al. in *Assessing War.* All make the same point in different ways.[278] They point to the underlying misalignment of incentives, motivations, and the inherent difficulty in assessing the human domain. Hayes and Nguyen's capstone

---

[276] Liddick, Dickerson, and Chung, "Calibrating Civil Affairs Forces for Lethality"; Krohley, "Moving Beyond the Post-9/11 Manhunt"; Yager, "Setting the Civil Affairs Analytical Foundation."

[277] Krohley, "Moving Beyond the Post-9/11 Manhunt."

[278] Shore, *A Sense of the Enemy*, 1; Richard A Clarke and Randolph P. Eddy, *Warnings: Finding Cassandras to Stop Catastrophes* (New York, NY: HarperCollins Publishers, 2017), 57–74; *Assessing War: The Challenge of Measuring Success and Failure*, Book Collections on Project MUSE. (Washington, D.C: Georgetown University Press, 2015).

work at the Naval Postgraduate School captured this point in a different way. The point is that the CA leadership's continued rebranding and overselling the value of CA analytical capabilities damages CA's reputation and brand.[279]

Perhaps the largest confirmation of Krohley's point is Flynn et al.'s assessment that civil information was severely underutilized by military intelligence analysts.[280] It is a testament to the lack of fusion and synthesis associated with the information provided by CA forces, despite a steady volume of reports and information generated through its partner network. However, it would be folly to attribute these integration failures to the people. As Edward Deming, the founder of Total Quality Management, identified it was not the person, but the process.[281] He dedicated three chapters of his book, *The New Economics,* to communicate this point. His methods revolutionized management processes for Japanese companies such as Toyota. The result was astounding with Japanese auto manufacturers seizing a significant share of the market from their American counterparts. These factors bring about a relevant question. Why would CA continue to champion the same methodology and processes if their performance is known to be ineffective, or at the very least inconclusive? Yager provides some insight into why CA analytical processes struggle to make sense of things, something the JCIM User's Manual refers to as "sensemaking."[282]

Yager's criticism of CA doctrine is brutal. He emphasizes CIM doctrine recommends using useful analytical techniques without providing a standard method of executing its analysis recommendations.[283] CIM doctrine deprives CA practitioners of the tools necessary to reach conclusions. Yager describes CA analysis as building descriptive products for others to analyze. The *Army Field Manual 3-57: Civil Affairs Operations*

---

279 Hayes and Nguyen, "CA 2025," 55–57, 98.

280 Flynn, Pottinger, and Batchelor, *Fixing Intel*, 1–7.

281 W. Edwards Deming, *The New Economics for Industry, Government, Education*, Second Edition (Cambridge, MA: Massachusetts Institute of Technology Center for Advanced Education Services, 1994), 158–71.

282 United States Special Operations Command, *JCIM User's Manual 2.0*, 1–3.

283 Yager, "Setting the Civil Affairs Analytical Foundation."

highlights that CA analysis is a joint effort with military intelligence professionals.[284] The caveat to this point is that military intelligence analysts are responsible for analyzing the threats, not the civil component of the environment. The common counterargument to this is that CA analysis is the responsibility of CA forces at every echelon, yet these forces are not trained in how to determine statistical relationships between variables. Thus, the uncertainty associated with assessing the effects of CAO becomes apparent. How do CA forces know if their actions were effective? How do they know if they used their resources efficiently? They cannot be certain because, despite their persistent presence, they lack the means to test the effectiveness of their operations and strategic approaches. Does this argument sound familiar? These are the same arguments encountered in the case studies across the MLB, law enforcement, and medicine. Archie Cochrane had to destroy the counterargument to his advocacy of evidence-based medicine in his book, *Effectiveness and Efficiency: Random Reflections on Health Services,* for the medicine to cease its resistance to change.[285] He understood the only alternative to controlled testing is the illusion of insight.[286] Similarly, CA must test their conclusions and find new ways to see their operational environment objectively. In doing so, they can dispel the false narratives and influence efforts towards more efficient conclusions that close the Clausewitzian Gap.

Unfortunately, the *Civil Affairs: 2025 and Beyond* identifies the components of the solution in the same way CA doctrine articulates its recommended analytical processes.[287] It identifies a laundry list of required analytical capabilities, some of which would greatly enhance the CA's analytical capabilities. The focus on managing complex data sets, database management, and modeling are steps towards building a data science and open-source data analysis capability. These tools are needed to share and consume data across platforms and share with data fluent partners. The document also prescribes developing a

---

[284] Department of the Army, *Civil Affairs Operations*, 1–7.

[285] Fisher, Johnston, and Clement, "Is Intelligence Analysis a Discipline?," 62.

[286] Tetlock and Gardner, *Superforecasting*, 32.

[287] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*, 7–9.

predictive analysis, which requires a thorough understanding of statistics and other mathematical applications. These capabilities will require significant investment from the CA Branch to develop and retain. Continuing education and training will be required to preserve these skills. Technology-enabled analysis makes these skills possible, yet these processes cannot be ceded solely to machines. Even Nate Silver's system, PECOTA, is prone to issuing false positives where human intuition would not.[288]

Unfortunately, most of these skills require a graduate-level education to employ efficiently and effectively. If CA forces assessed and selected its population on their aptitude and potential to fill analytical roles, then the process of developing the capability would be a far easier task. Other organizations in the intelligence community view intelligence analysis as it's a distinct discipline, bordering on a vocation.[289] They take intelligence analysis seriously, and the Civil Affairs Branch does not from an institutional standpoint. Three pieces of evidence that support this claim. First, CA analysts rely on external support to analyze their data and develop their own conclusions.[290] Next, despite the effort applied in the aforementioned types of analysis outlined in the CIM process, CA forces make inductive arguments based on their observations. There is no testing capability to determine the validity of their claims. Finally, the primary responsibility for executing the CIM process at the team level rests with the CA Team Leader and CA Noncommissioned Officer, the most inexperienced members on most CA teams.[291] CA forces must be prepared to approach their analysis of the civil component with the same rigor as their intelligence community counterparts.

---

[288] Silver, *The Signal and the Noise*, 91.

[289] Fisher, Johnston, and Clement, "Is Intelligence Analysis a Discipline?," 57–79; Mark M. Lowenthal, "The Education and Training of Intelligence Analysis," in *Analyzing Intelligence: National Security Practitioners' Perspectives*, Second edition (Washington, DC: Georgetown University Press, 2014), 303–18; Nelson, "Analytic Outreach," 319–36.

[290] Department of the Army, *Civil Affairs Operations*, 1–7.

[291] Responsibilities are consistent across CA elements in SOF, General Purpose Forces, and Reserve formations. 95th Civil Affairs Brigade. "ARSOF CAT Roles and Responsibilities" Presented at 1st Special Forces Command, Fort Bragg, NC, March 3, 2017.

One conclusion drawn from the literature is the investment in human potential necessary to meet the analysis capability outlined in *Civil Affairs: 2025 and Beyond*.[292] The Civil Affairs Branch is fortunate to possess a depth of talent within its ranks. Many of the successes claimed by CA formations can be attributed to the diverse make-up of its members. The reason for episodic analytical brilliance is often due to soldiers with a previous background in data science or intelligence analysis. This statement is supported by Eric Yager's argument when he states, "the actual application of data analytics to CA operations is either never done or is relegated to CA practitioners who previously studied data analytics."[293] Civil Affairs has the components to conduct data analytics, but without formal training, it cannot assemble the pieces. The problem starts with doctrine and exacerbated by CA forces' focus on supporting tactical operations at the expense of supporting operational and strategic echelons.[294]

2. Organizational Design

In their response to Flynn et al.'s argument that the military intelligence organizational structure required a drastic reform to remain relevant and meet the needs of counterinsurgency operations, Blanken and Overbaugh suggest that an organization's design must complement the environment in which it is designed to operate.[295] Their description of an adhocracy environment and requirements for organizations to operate effectively mirrors the future operating environment and potential CA organizational structures. CA formations, particularly their analytical elements, must be designed to operate in these environments effectively. Blanken and Overbaugh provide a list of characteristics concerning management structures, personnel, and investment required for

---

[292] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*, 7–9.

[293] Yager, "Setting the Civil Affairs Analytical Foundation."

[294] CA support to TSOCs diminished in 2017 when USSOCOM mandated the two-to-one dwell time for its forces. CA leadership within the 95th Civil Affairs Brigade (SO)(A) and USSOCOM cut support to TSOCs by collapsing Theater Civil Military Support Elements (TCMSE) into Regional Civil Military Support Elements (RCMSE) or chose not to support the Global Force Management (GFM) Force Tracking Number (FTN) requirement.

[295] Blanken and Overbaugh, "Looking for Intel?," 564–66.

success as continuous, rigorous, and demanding. Given these characteristics, CA must decide on whether it prioritizes the tactical or the operational and strategic echelons.

Concerning the potential return on investment offered by this strategic civil affairs analysis capability, Eric Yager suggests placing a data analysis capability with either the TSOC or GCC staff because these assignments typically last two to three years.[296] Personnel would have the longevity and focus required to build a contextual understanding of the environment. Additionally, this type of analysis occurs over long periods, depending on the units of measure and time-series qualities of the data. With USSOCOM mandating a two-to-one dwell time between deployments for its forces, it is unlikely a rotational presence could sustain the commitment required by persistent presence requirements. Furthermore, rotationally deployed forces would lack the endurance required to see the evolution of the operational environment throughout iterated six-month rotations. Placing this data analytics capability within the TSOC or GCC would enable more effective and efficient integration of civil knowledge with its interagency and multinational partners of the GCC staff. CKI is nested with the commander's intent, and placing this analytic capability on the operational staff integrates the insights generated from the analysis into operational and strategic plans at the TSOC and GCC echelons. Enduring relationships perform better than episodic relationships when it comes to coordination and collaboration.[297]

Yager's suggestion challenges the conventional wisdom, which is to retain this analytic capability in CA formations at the Company-level to support tactical elements. The CA FMA Directorate appears to favor retaining the analytical capabilities outlined the *Civil Affair: 2025 and Beyond* within CA's organic formations, allowing for potential alignment with the Intelligence, Cyber, Electronic Warfare, and Signal (ICEWS) concept

---

[296] Yager, "Setting the Civil Affairs Analytical Foundation."

[297] Barbara D. Adams and Robert D.G. Webb, "Trust in Small Military Teams" (Humansystems Incorporated), accessed March 10, 2019, http://www.dodccrp.org/events/7th_ICCRTS/Tracks/pdf/006.PDF.

within a CA Company Headquarters to comprise a portion of a MDTF.[298] It is a question of priorities for those designing the new capability, determining its purpose, and assessing its potential strategic utility to the force. This leads to a broader question. Should the strategic utility of Civil Affairs reside within the U.S. Army General Purpose Forces (GPF) or USSOCOM SOF formations under CME?

3. Is Civil Affairs Doctrine Reductivist?

In his article "Tactical Wins into Strategic Success," Krohley claims that the PMESII-PT framework that drives CA analysis is reductivist in nature.[299] He describes it as "a 'fill in the blanks' approach of our ASCOPE and PMESII frameworks drives a closed, reductive intellectual process that is ill suited to delivering granular, actionable insights."[300] An example of this would be a standard format on a contact report that lacks a section for conversational context, as it only focuses on attributes. Where the form is neat, tidy and professional-looking, it lacks the capacity for content relevant to the analysis. Many insights can be missed as a result of formatting. Another example of this approach would be an online home loan application following an overseas assignment lasting more than two years, and the only response the system will accept is a U.S. residential address. The system of data capture loses context when items do not fit neatly into categories.

There is merit to Krohley's argument. For example, the graphic taken from *Joint Publication 3-57: Civil-Military Operations* and depicted in Figure 12 is a representation of CIM's suggested purpose, which is to "connect-the-dots."[301] It shapes how the Joint Force understands the employment of CA forces and how CA forces understand CIM. While ceding the point that the figure is labeled notionally, the figure is a mental model shaping the perception of what in reality would be a dense network of relationships. All

---

[298] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*, 6–9; U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, RE: CIM/ HTA Information, personal communication, December 11, 2019.

[299] Krohley, "Moving Beyond the Post-9/11 Manhunt."

[300] Krohley.

[301] Office of the Joint Chiefs of Staff, *Civil-Military Operations*, C–3.

assumptions must be assessed. Which leader is the legitimate authority in the area? This is a difficult question to answer without proper methodology and metrics. CA's current methodology and processes lack the capacity to measure these types of observations or test its judgments.[302]
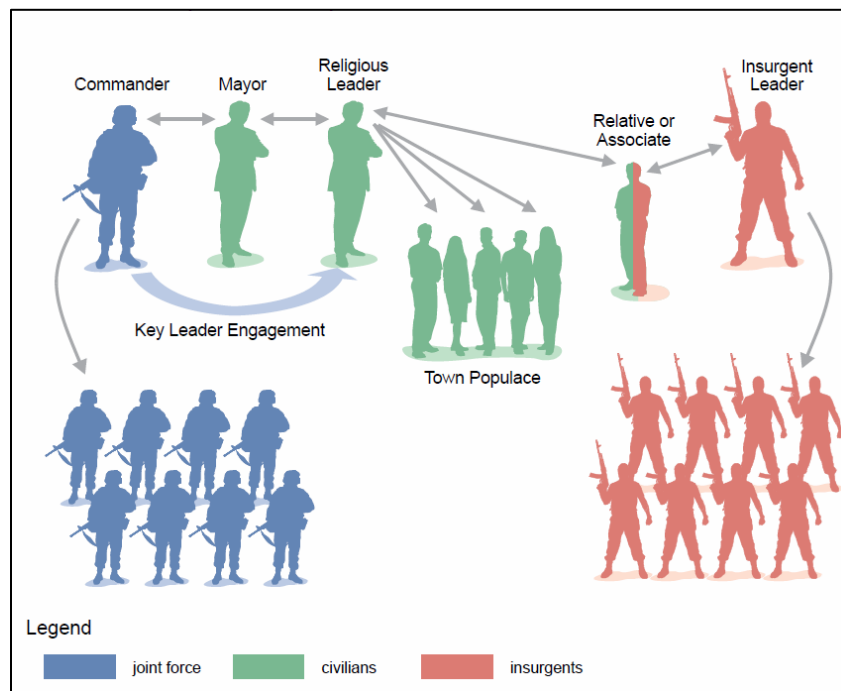
Figure 12.   Notional Civil Information Management Connects-the-Dots
between People in the Operational Environment[303]

Another example from the *Joint Publication 3-25: Countering Threat Networks* depicts a notional threat organization.[304] Figure 13 depicts a threat network organized as a centralized hierarchy of threat network actors and capabilities.[305] The threat network in reality could include actors operating in multiple roles amid multiple overlapping

---

[302] The analytical methods prescribed in the CA doctrine such as link analysis are subjective.

[303] Source: Office of the Joint Chiefs of Staff, *Civil-Military Operations*, C–3.

[304] Office of the Joint Chiefs of Staff, *Countering Threat Networks*, Joint Publication 3-25 (Office of the Joint Chiefs of Staff, 2016), C–3.

[305] Office of the Joint Chiefs of Staff, III–10.

legitimate and covert networks. The reality is always messier and more complex. Krohley illustrates this point as well. He argues that U.S. lethal targeting methodologies assess threat networks as if they exist separate from the populations that support them.[306] Figure 13 illustrates this point and suggests the U.S. should be focusing on the blind spot that is not represented in this graphic, or the actors with the ties to legitimate political authorities, without which these insurgencies would fall apart.
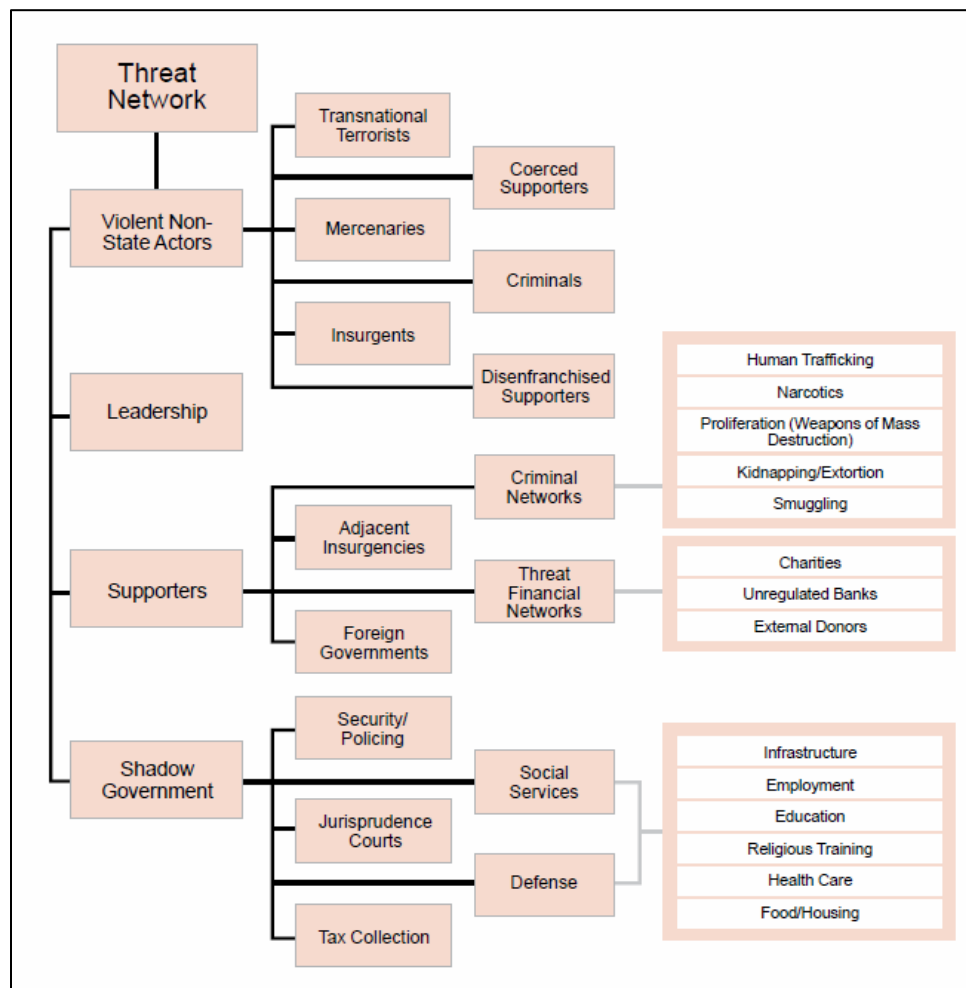

Figure 13.   Visualization of a Notional Threat Network[307]

---

[306] Krohley, "Moving Beyond the Post-9/11 Manhunt."

[307] Source: Office of the Joint Chiefs of Staff, *Countering Threat Networks*, III–10., Figure III-6.

V.   CLOSING THE GAP: INNOVATIVE APPROACHES FOR CIVIL KNOWLEDGE INTEGRATION

In simple terms, the CA Branch requires an innovative approach similar to the ones illustrated in the case studies. In the case studies, challenging environments forced organizations to innovate. Similarly, CA forces find themselves in the same situation. Some argue the future operating environment arrived in 2014 when Russia seized Crimea in a *fait accompli* action.[308] Thus, CA should approach developing an analytical capability worthy of serving the MDTFs and Joint Force with urgency, a critical factor in organizational transformation.[309] Future operating environments will continue to evolve in complexity and turbulence.[310] As such, the U.S. Army's MDTFs and the Joint Force will require CA to improve its analytical capabilities to understand their environment and develop pathways that ensure favorable outcomes.[311] To do so, CA must prioritize its analytical quotient as the CA FMA identified. The scale and placement of this capability may remain subjects of debate, but the development of innovative analytical means with which to analyze the civil component of the operating environment is not. The components of the solution lie in establishing competencies with data to utilize data science techniques and incorporating social network analysis (SNA) as a means of assessing networks of interest to generate insights that inform operational and strategic approaches. The success of the CA branch rests upon its ability to execute this task.

A.   DATA SCIENCE APPROACHES AND TECHNIQUES

As in the case studies, Civil Affairs must improve its analytical quotient to meet the complex challenges of the FOE. After publishing the *Civil Affairs: 2025 and Beyond*,

---

[308] United States Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, 7.

[309] Kotter, *Leading Change*, 48.

[310] Office of the Joint Chiefs of Staff, *JOE 2035*.

[311] United States Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, 17.

Civil Affairs leadership find themselves in the shoes of Billy Beane and Bill Bratton, claiming that a new approach is required to deliver on their commitments to support MDO formations. What Civil Affairs is missing is a means to test their assumptions and actions. Much like the resistance Archie Cochrane encountered, some within the CA Branch see no need or pathway available to test something they perceive to be intangible. However, as readers noted in *Moneyball*, Civil Affairs is the victim of inefficient data capture.[312] The first thing CA elements require is a methodology capable of capturing and validating their data. Fortunately, these techniques and methodologies exist. Data science and open-source data analysis share some common components that combine to provide the means to begin identifying the relevant relationships within the operational environment and assessing them objectively.

1. What Is Data Science?

The term data science is difficult to define due to its interdisciplinary background, ambiguous boundaries, and evolutionary nature. Wil Van der Aalst, one of the leading authorities on data science and process mining, examines these points in his book *Process Mining: Data Science in Action* writing,

> In recent years, data science emerged as a new and important discipline. It can be viewed as an amalgamation of classical disciplines like statistics, data mining, databases, and distributed systems. Existing approaches need to be combined to turn abundantly available data into value for individuals, organizations, and society."[313]

The amalgamation of other fields is an important aspect of data science because fusing elements of other fields together such as applied statistics, computer science, and data mining is useful for providing additional analytic methods; yet, the field of data science is constantly evolving. Figure 14 provides a visual representation of the disciplines that comprise data science. Of particular interest to CA forces are the behavioral and social

---

[312] Lewis, *Moneyball*.

[313] Wil Van der Aalst, *Process Mining: Data Science in Action*, 2nd ed. (Berlin, Heidelberg: Springer-Verlag Berlin Heidelberg, 2016), 3, https://doi-org.libproxy.nps.edu/10.1007/978-3-662-49851-4.

sciences and predictive analytics applications of data science, as these topics are used to influence people and help ascertain future trends.

Despite the issues of providing a precise definition, Wil van der Aalst provides a broad definition of data science writing:

> Data science is an interdisciplinary field aiming to turn data into real value. Data may be structured or unstructured, big or small, static or streaming. Value may be provided in the form of predictions, automated decisions, models learned from data, or any type of data visualization delivering insights. Data science includes data extraction, data preparation, data exploration, data transformation, storage and retrieval, computing infrastructures, various types of mining and learning, presentation of explanations and predictions, and the exploitation of results taking into account ethical, social, legal, and business aspects.

> The above definition implies that data science is broader than applied statistics and data mining. Data scientists assist organizations in turning data into value. A data scientist can answer a variety of data-driven questions. These can be grouped into the following four main categories [146]:

> - (Reporting) What happened?
> - (Diagnosis) Why did it happen?
> - (Prediction) What will happen?
> - (Recommendation) What is the best that can happen?[314]

This is the definition that CA Branch should utilize as they establish an analytic capability. The definition, while broad, focuses on delivering value using data in the media outlined in *Civil Affairs: 2025 and Beyond* while continuing to provide the CA narrative in the reporting and diagnosis roles needed to fuel both U.S. Army and joint information requirements.[315] This data science definition parallels the Civil Affairs Proponent's definition of civil knowledge integration and describes tasks that enable CA forces to deliver value to their supported commanders. However, there is one key difference between the data science and civil knowledge integration concepts, data science is constantly evolving with the open-source community developing new methods of analysis daily. The

---

[314] Van der Aalst, 10–15.

[315] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*.

benefits of incorporating data science approaches into civil knowledge integration are the adaptive properties of the data science field. As operational environments evolve in complexity, data science will continue to develop methods with which to assess it.
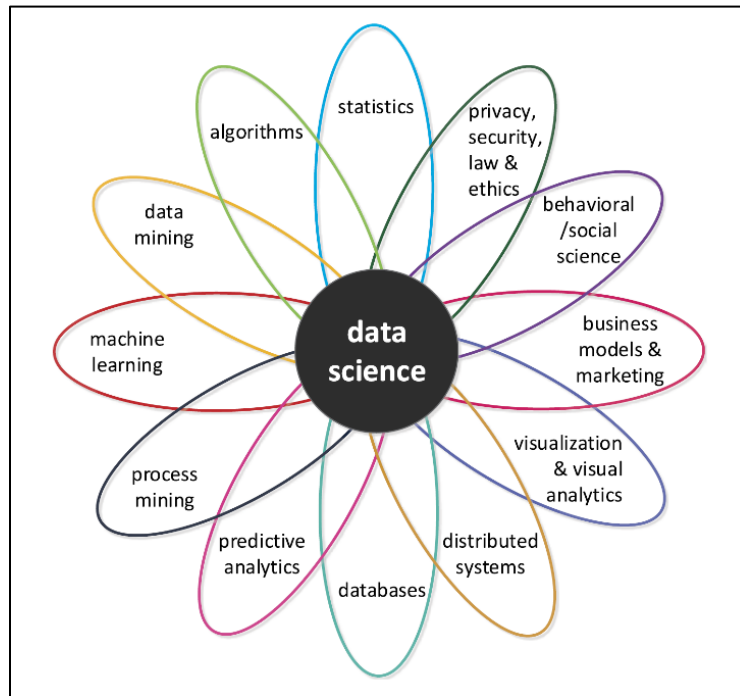
Figure 14.   The Components of Data Science[316]

Unfortunately, many conflate the term data science with coding, big data, machine learning, and artificial intelligence.[317] While these are aspects of data science that receive the most attention, these terms also constitute buzzwords that create a perception that data science can only generate insights using highly advanced contract systems to perform sophisticated analytical tasks. In reality, CA forces could reap benefits from integrating the most basic forms of data science. In his journal article "Big Data and Science: Myths and Reality," Jagadish dispels these common misperception writing:

---

[316] Source: Van der Aalst, *Process Mining*, 12. Figure 1.5

[317] Hosagrahar Visvesva Jagadish, "Big Data and Science: Myths and Reality," *Big Data Research* 2, no. 2 (2015): 49–52, https://doi.org/10.1016/j.bdr.2015.01.005.

It is completely understandable that many lay people picture a Big Data System as a magic piece of software that takes Big Data as input and produces deep insights as output. Unfortunately, this misperception suits many companies, and even some academics, very well. This way, someone who builds a Big Data system (in the sense described above) can create the illusion of solving the whole problem from soup to nuts even if they are focused on just a piece of it. The same goes for someone who develops a novel analysis algorithm. But Big Data is most definitely not machine learning on Map Reduce.[318]

In other words, Jagadish argues that data science cannot be distilled into one piece of software that magically provides insights to an organization. He contends that people will remain a critical part of the intense analytical process. He continues explaining this point in the following paragraph writing:

The main point it makes is that there are many steps to the Big Data analysis pipeline, with crucial decisions required at each step, and many challenges to address in each. The first decision is what data to record or acquire, and how to make the best of data that is imperfect. Then decisions must be made to represent the data in a manner suitable for analysis, possibly after extraction, cleaning, and integration with other data sources. Even in the analysis phase, which has received much attention, there are poorly understood complexities in the context of multi-tenanted clusters where several users' programs run concurrently. The final interpretation step is perhaps the most crucial, because it cannot be delegated – someone is responsible for making decisions based on the result of the data analysis and this person has to understand and trust the results obtained first.[319]

Jagadish's argument is critical because it indicates that CA analysts must be the ones making these decisions, especially when it comes to issues of inconsistency and incomplete data.[320] The perspective of CA analysts will be critical towards defining the boundaries and organizing the analysis. In short, CA forces cannot delegate this task to others or software if they want to trust the results of their analysis.

---

[318] Jagadish, 50.

[319] Jagadish, 50.

[320] Jagadish, 51.

2.   What Is Open-Source Data Analysis?

In his article "Using Big Data to Ask Big Questions," Chase Davis, a journalist at the *New York Times*, argues that datasets of varying sizes allow researchers and journalists to explore both big questions and small questions data scientists would have never thought to ask.[321] As in the cases discussed above, the key to understanding an environment begins with efficient data capture and sound statistical analysis.[322] Following this foundation in statistics, open-source data analysis leverages open-source data, which is increasingly available within the open-source community, academia, nongovernmental organizations, and government agencies ranging from the municipal to the federal-level.[323] In fact, many U.S. government agencies publish datasets to provide their citizens with enough information to make informed decisions on topics such as property values, crime, and flood zone watershed.[324] While CA analysts should not limit their scope to open-source data, they should know where to find datasets useful to their analysis.

The last component of open-source data analysis is using open-source software for the statistical computing required to analyze the datasets. This contrasts with many of the systems currently employed by CA forces and their analytical elements. While these systems are useful for many purposes, alternative open-source software and analytical tools have been made available by a distributed online community of developers on a free and open basis, and these open-source tools increasingly offer more advanced analytic capabilities than those provided by traditional CA systems. However, there is one caveat: using open-source software combined with the suggested techniques will require

---

[321] Davis, "Using Big Data to Ask Big Questions."

[322] Lewis, *Moneyball*.

[323] United States Agency for International Development Data Services, "USAID Foreign Aid Explorer - About"; City of Chicago, "Crimes - 2019," Crime Data, Chicago, 2019, https://data.cityofchicago.org/Public-Safety/Crimes-2019/w98m-zvie; Federal Emergency Management Agency, "FEMA Flood Map Service Center," Federal Emergency Management Agency, accessed December 1, 2020, https://msc.fema.gov/portal/home.

[324] City of Chicago, "Crimes - 2019"; Federal Emergency Management Agency, "FEMA Flood Map Service Center"; United States Agency for International Development Data Services, "USAID Foreign Aid Explorer (FAE)," accessed June 1, 2019, https://explorer.usaid.gov/data.

significantly more training and education to employ effectively across CA forces. This is one criticism and argument against placing this capability in the CA formations at the company-level. The investment required to make this training common to all CA forces may be too great to achieve a significant return on investment.[325] The more economical approach would limit the scope of the activity to attract qualified candidates with regionally-focused context from within the branch. This has important implications for the added capability, particularly in collaboration and coordination efforts with interagency and UAP partners if integrated properly.

3. Benefits over Existing Analytic Methods in Civil Affairs

Unfortunately, standard methods for analyzing data using both data science and open-source data analysis techniques do not exist in CA doctrine.[326] Adding any capability using these disciplines would greatly aid CA in several ways. The first way of adding this capability would begin the long-avoided transition to developing quantitative approaches towards assessment and investment.[327] CA must begin to assess their investments in its network and outcomes. Without committing this approach, CA will remain in the dark about the efficacy of their prescriptions.

The second way this capability benefits CA forces is the potential to gain effectiveness and efficiency in their operations. If CA forces can execute CKI with newly attained insights, then future MDTFs, U.S. Army, and Joint Force will be better postured to make decisions on where to focus their efforts. The strategic value of reducing the complexity of the environment paid a dividend in many other cases rich with data such as baseball, law enforcement, and medicine. There is no reason to suspect an analysis of the operational environment using these methods would be any less beneficial. Making

---

[325] Mark Atkinson, "HRC CA Branch Brief" (Human Resources Command, November 25, 2019).

[326] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*, 7–9.

[327] Yager, "Setting the Civil Affairs Analytical Foundation."

informed decisions balanced by the probability of success or failure is better than the subjective approaches currently employed.[328]

4.   Applications

There are many open-source data analysis applications using these techniques. However, most of these applications only exist in academia and private industry.[329] Hedge funds use these techniques to evaluate financial data to make predictions about markets and structure their financial positions to maximize gains while protecting against deep losses. While the U.S. Army's military intelligence elements possess open-source intelligence analysts, these analysts doctrinally focus their attention on the threats to U.S. Force, or they are assigned to develop an understanding of their operational environment through the analysis of public records, public speeches, and foreign media.[330] In essence, open-source intelligence analysts are ill-suited to the tasks required in evaluating the civil component of future operating environments. Flynn et al. discussed this topic at length, concluding that reform of the intelligence community was necessary to improve the performance of U.S. forces combating irregular threats.[331]

So, where does that leave U.S. forces? U.S. forces must now adapt to the demands of their environment. Figure 15 is a representation of the data science hierarchy of needs. It shows in graduated levels of advancement the increasing sophistication of needs as organizations with varying resources seeking to leverage data-driven approaches must

---

[328] Kahneman, *Thinking, Fast and Slow*, 224; Tetlock and Gardner, *Superforecasting*, 30–31, 69–79; Lewis, *Moneyball*.

[329] T. Camber Warren, "Not by the Sword Alone: Soft Power, Mass Media, and the Production of State Sovereignty" 68, no. 1 (2014): 111–41, https://doi.org/10.1017/S0020818313000350; T. Camber Warren, "Explosive Connections? Mass Media, Social Media, and the Geography of Collective Violence in African States," *Journal of Peace Research* 52, no. 3 (2015): 297–311, https://doi.org/10.1177/0022343314558102; Jason Lyall, "Does Indiscriminate Violence Incite Insurgent Attacks?: Evidence from Chechnya," *Journal of Conflict Resolution* 53, no. 3 (2009): 331–62, https://doi.org/10.1177/0022002708330881.

[330] Department of the Army, *Open-Source Intelligence*, Army Techniques Publication 2-22.9 (Washington, DC: Headquarters, Department of the Army, 2012), 1–22, https://fas.org/irp/doddir/army/atp2-22-9.pdf.

[331] Flynn, Pottinger, and Batchelor, *Fixing Intel*, 1–9.

transition to meet the needs of their customers.[332] CA forces are in the early phases of the "explore/transform" stage. The immediate needs of CA rest in the "aggregate/label" stage, as this thesis is promoting analytics. If Civil Affairs wants to transition to an "AI/Deep Learning" organization in the future, it must first understand and establish the analytics that provides its foundation.
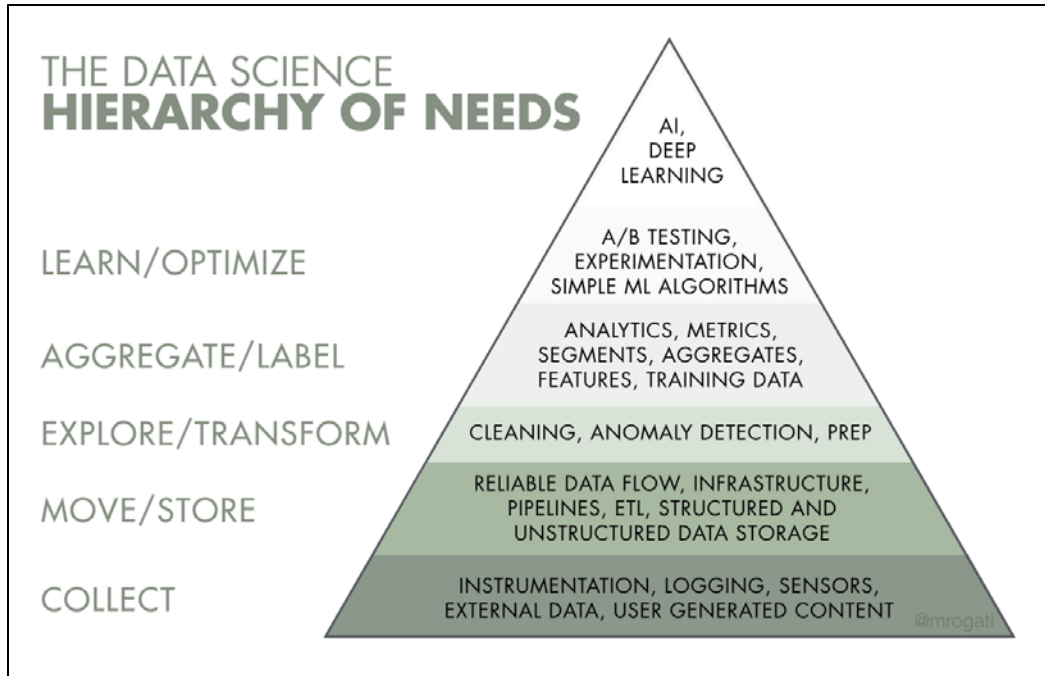
Figure 15.   The Hierarchy of Data Science Competences [333]

5.   Connecting Data Science to Civil Knowledge Integration

The data science and open-source data analysis methods and techniques discussed here provide an opportunity for greater civil knowledge integration for three reasons. First, data science and open-source data analysis techniques extract knowledge insights from the

---

332 Joma Tech, "What REALLY Is Data Science? Told by a Data Scientist," YouTube, June 22, 2018, https://www.youtube.com/watch?v=xC-c7E5PK0Y&t=12s; Monica Rogati, "The AI Hierarchy of Needs," Hackermoon, June 12, 2017, https://hackernoon.com/the-ai-hierarchy-of-needs-18f111fcc007.

333 Source: Rogati, "The AI Hierarchy of Needs."

data. These techniques allow for assessment of the correlation between variables in the operational environment over time. These insights are easier to consume and promote a common understanding of the environment. CompStat was a clear example of how this concept could work in practice in a governance role.[334]

Second, these techniques contribute to greater CKI because to the CA doctrinal outputs feeding both U.S. Army and Joint planning processes is not contextually relevant. The doctrinal CA outputs, while informative, are not contextual and not designed to link specific variables outside of doctrinal PMESII-PT/ASCOPE in a meaningful way, other than to mention that an association appears to exist.[335]

The third way these methods contribute to enhanced CKI is the ability to incorporate interagency and UAP data. Without the development of this capability, the integration of these datasets and relevant civil information into Army processes is neither efficient nor effective.

6.   Components of the Analytical Method

There are a number of components to developing a competence in application of data science and opens source data analysis techniques. The following components and considerations are far from all-inclusive, but represent an important starting point for assessing the requirements for developing an initial capability.

a.   *Developing Structured Data*

Data comes in two forms: structured and unstructured. Hadley Wickham and Garrett Grolemund refer to structured data as rectangular data in their book, R for Data Science, which is a representation of structured data.[336] It is an effective way of indicating that data must be transformed into a format that machines understand. This format is rows and columns, in which rows are observations and columns are variables. Civil Affairs

---

[334] Vogt, "The Crime Machine."

[335] Krohley, "Moving Beyond the Post-9/11 Manhunt."

[336] Hadley Wickham and Garrett Grolemund, *R for Data Science: Import, Tidy, Transform, Visualize, and Model Data*, Second Release (Sebastopol, CA: O'Reilly Media Inc, 2016), xiii.

doctrine off-handedly references the relevance of structuring data into spreadsheets for data storage or inclusion into other data management infrastructures such as databases. In essence, the value of building structured datasets for analytical purposes (i.e., determining the relationships between variables) was never considered or communicated. Similarly, structured datasets are requested in most unit CIM reporting standard operating procedures, yet CIM Chiefs seldom enforce their creation because CA doctrine lacks a medium to leverage data in this form. Doctrine must change to stress the importance of creating structured data sets for further analysis in statistical software.

b.   *Transparent Collection Methodologies*

One important element missing from the current CA methodology involves the development of a coding scheme prior to collecting the data. The decision of selecting a coding scheme is critical because it determines the focus of their reports and the relevance of specific associations. Rigorous data codebooks provide a transparent description of original sources of information and the objective and subjective factors underlying coding choices.

Codebooks are commonly found accompanying the open-source datasets. The Kent State University Library suggests codebooks should contain the following criteria:

- The name assigned to the variable
- What the variable represents (i.e., its label)
- How the variable was measured (e.g., nominal, ordinal, scale)
- How the variable was actually recorded in the raw data (i.e., numeric, string; how many characters wide it is; how many decimal places it has)
- For scale variables: The variable's units of measurement
- For categorical variables: If coded numerically, the numeric codes and what they represent[337]

It further notes, "A good codebook allows you to communicate your research data to others clearly and succinctly, and ensures that the data is understood and interpreted

---

[337] Kristin Yeager, "LibGuides: SPSS Tutorials: Creating a Codebook," February 10, 2020, https://libguides.library.kent.edu/SPSS/Codebooks.

properly."[338] Thus, codebooks are the primary method for researchers and analysts to list key assumptions, limitations, and to explain the creator's criteria for observations, variables, methods of evaluation. As such, they affect the boundaries and sources used to capture the data in a data collection plan in a structured way in either matrices, edge lists, or node lists. Following the data collection, an analyst must determine what type of analysis is the most appropriate for the data given the nature of the problem and time available to complete the task.

c. Units of Analysis

Units of analysis are fundamental to any analytical effort.[339] They determine the scope and scale of analysis. The units of analysis should be relevant to the problem or research question, and would be determined by supported commanders or other stakeholders as required. Additionally, the units must be consistent with the limits of the available data collection methods. The units of analysis drive the number of observations; however, the units will also be limited by an analyst's ability to collect time-series data. Units of analysis will likely vary depending on the medium employed to obtain the data. For example, a social media application programming interface (API) offers the ability to collect data on a scale not possible in other media where individual observations occur at fixed intervals.[340] APIs and social media offer the ability to collect data accruing an exceptionally high rate.[341]

---

[338] Yeager.

[339] Daniel Cunningham, "Lexical Analysis" (Lecture, Visual Analytics, Naval Postgraduate School, August 13, 2019); Matthew Decarlo, "Unit of Analysis and Unit of Observation," in *Scientific Inquiry in Social Work* (Roanoke, VA: Open Social Work Education, 2018), 182–86, https://scientificinquiryinsocialwork.pressbooks.com/chapter/7-3-unit-of-analysis-and-unit-of-observation/.

[340] Daniel Cunningham, Sean Everton, and Philip Murphy, "Collecting, Coding, and Manipulating Social Network Data," in *Understanding Dark Networks: A Strategic Framework for the Use of Social Network Analysis* (Lanham, MD: Rowman & Littlefield, 2016), 35–84.

[341] Red Hat, "What Is an API?," Red Hat Integration, 2020, https://www.redhat.com/en/topics/api/what-are-application-programming-interfaces.

d.   *Open-Source Data*

The amount of data available today is staggering. Everyone from rural counties to metropolitan cities release data daily related to things such as crime, property, and traffic. Similarly, research institutions publish their data for users to manipulate and analyze. There are a variety of sources and types of data. The format and composition of the data determines the methods available for data analysis. These methods consist of geospatial, relational, temporal, and lexical analysis, all of which are useful at producing insights into the OE. Open-source datasets featuring categorical, geospatial, and temporal data exist across USG agencies, academia, IGOs, NGOs, and development banks. Some examples include the United States Agency for International Development Foreign Aid Explorer, Organization for Economic Cooperation and Development (OECD), Fragile State Index, Armed Conflict Location Event Database (ACLED), The World Bank, and Uppsala Conflict Data Program.[342] These and many other organizations provide structured data sets that can be used for exploratory and explanatory data analysis. Figure 16 is an example of using this analytical technique to extrapolate insights from the relationships between variables within the OE.

Figure 16 is a visual representation of a structured dataset compiled from multiple sources and transformed into a dataset with a country-year unit of analysis. Of note, the Corruption Perception Index (CPI) assesses the perceived levels of state corruption and transparency, with higher values representing countries with more corruption. The Fragile State Index (FSI) estimates the factionalization of elites within countries on a scale from 0 to 100, with higher values representing states with more factionalized elites. Figure 16 is significant because it appears to show a positive correlation between U.S. foreign assistance and foreign aid flows, perception of state corruption, and factionalized elites from 2006 to 2015. The appearance of a correlation is significant because it indicates that

---

[342] United States Agency for International Development Data Services, "Complete Dataset," February 20, 2019, https://explorer.usaid.gov/prepared/us_foreign_aid_complete.csv; The World Bank, "World Bank Open Data," World Bank Open Data, 2019, https://data.worldbank.org/; ACLED, "ACLED Data," accessed March 27, 2019, https://acleddata.com/; Department of Peace and Conflict Research, "UCDP - Uppsala Conflict Data Program," accessed March 21, 2019, https://ucdp.uu.se/; The Fund for Peace, "Fragile States Index," April 10, 2019, https://fragilestatesindex.org/excel/.

states with higher perceptions of corruption receive the majority of U.S. foreign assistance and aid, which appears to create environments that further factionalizes elites within recipient countries. Exploratory analysis of this type provides a way to assess potential policy implications with respect to foreign assistance and aid flows to countries with substantial corruption. This example of exploratory analysis requires further confirmatory analysis to determine the significance of the correlation and any potential causal relationships, which is determined by lagging variables over time.
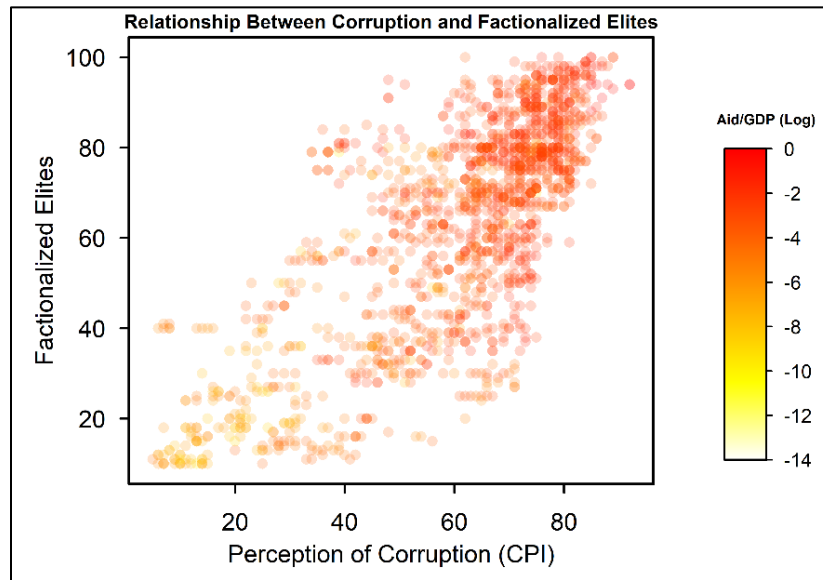
Figure 16.   The Relationship Between Factionalized Elites, Corruption, and
U.S. Foreign Aid by State Actor Gross Domestic Product (2006–2015)[343]

Figure 17 is the visualization of a quadradic model testing the relationship between state instability and a variable representing U.S. foreign aid as a percentage of the recipient state's gross domestic product (GDP). A logarithmic transformation is applied to smooth the distribution of extreme observations in the U.S. foreign aid as a percentage of GDP variable. The model controlled for state corruption, population, polity, human rights, and

---

[343] Adapted from The Fund for Peace, "Fragile States Index"; Transparency International, "Corruption Perceptions Index 2018," www.transparency.org, 2018, https://www.transparency.org/cpi2018; United States Agency for International Development Data Services, "Complete Dataset."

the number of years a state's chief executive occupied the office. The model shows a non-linear relationship between state instability and the amount of U.S. foreign aid the recipient state received as a percentage of their GDP from 2006 to 2015, which becomes more positive as aid levels increase. This positive correlation is evidence to support the hypothesis that U.S. foreign aid flows contribute to state instability. This model is relevant because it provides a method to determine a point where aid flows remain efficient, which could represent a significant leap forward for CA analysts. These analytic techniques are useful in evaluating past policy outcomes to generate insights for future operations and policy recommendations.
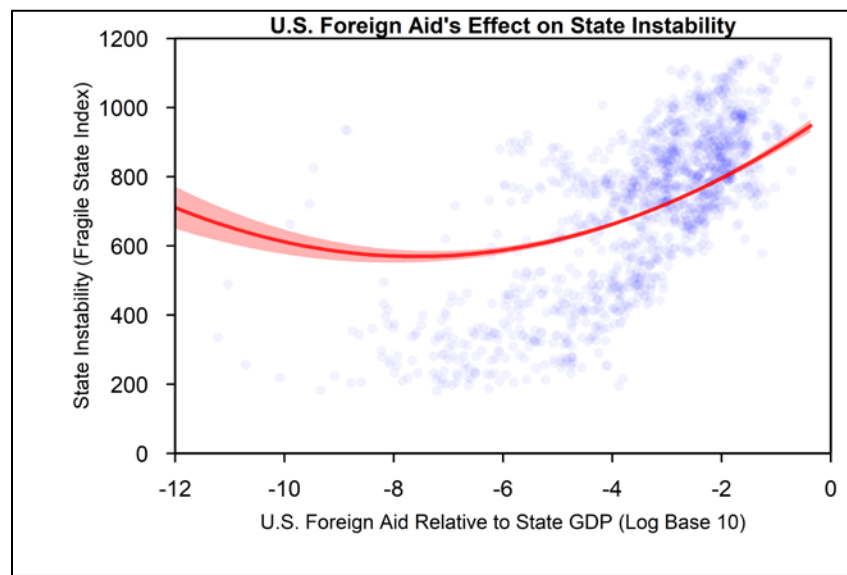

Figure 17.   The Effects of U.S. Foreign Aid on State Instability[344]

[344] Adapted from The Fund for Peace, "Fragile States Index"; United States Agency for International Development Data Services, "Complete Dataset"; The World Bank, "World Development Indicators," 2020, http://datatopics.worldbank.org/world-development-indicators/; Transparency International, "Corruption Perceptions Index 2018"; Monty G. Marshall, "Polity IV Annual Time-Series, 1800-2018," Center for Systemic Peace, July 27, 2019, http://www.systemicpeace.org/inscr/p4v2018.xls; Freedom House, "Country and Territory Ratings and Statuses, 1973-2018," May 8, 2018, https://freedomhouse.org/sites/default/files/2020-02/2020_Country_and_Territory_Ratings_and_Statuses_FIW1973-2019.xlsx; Inter-American Development Bank, "Database of Political Institutions 2015," April 17, 2019, https://mydata.iadb.org/Reform-Modernization-of-the-State/Database-of-Political-Institutions-2015/ngy5-9h9d; Carlos Scartascini, Cesi Cruz, and Philip Keefer, "The Database of Political Institutions 2017 (DPI2017)," *Inter-American Development Bank*, March 16, 2018, https://doi.org/10.18235/0001027.

e.   *Open-Source Data Analysis Software*

The collation and processing steps of the CIM process most accurately reflect the tidying and transforming steps, commonly referred to as wrangling, of the data exploration workflow described in the *R for Data Science* depicted in Figure 18.[345] To perform this function, CA analysts can use a variety of software. Figure 18 is the representation of conducting exploratory analysis and the subsequent processes prior to visualization. Often data sets require "tidying" to accommodate for typos, or other mistakes or irregularities.[346] Codebooks explain these irregularities and the parameters defining the data, hence their value. The information in these helps analysts make determinations in categorizing and interpreting data.
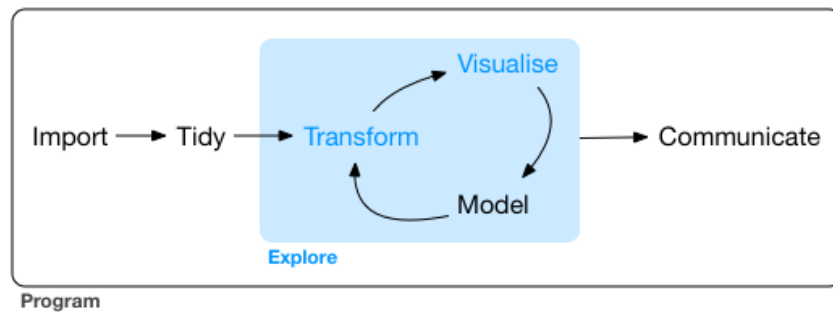
Figure 18.   Data Exploration Workflow[347]

(1)   R

R is a powerful, open-source programming language capable of wrangling, visualizing, and modeling large datasets. R uses downloadable software packages to execute a wide variety of tasks. It is free and the content on the Comprehensive R Archive Network (CRAN) and GitHub allow a for a wide variety of analyses using statistical, mathematical, visualization, modeling, and programming techniques. Its ability to process data across relational, geospatial, temporal, lexical, and statistical analyses makes it ideal

---

[345] Wickham and Grolemund, *R for Data Science*, 1.

[346] Wickham and Grolemund, 1–3.

[347] Source: Wickham and Grolemund, 1.

for researchers and analysts conducting exploratory and confirmatory analysis. The publication quality graphics, social network analysis, and geospatial packages continue to grow in application and complexity. The statistical regression analysis packages allow users to test and model the correlations they find during exploratory analysis.

(2)   Python

Python is a popular and powerful, general-purpose programming language adapted for functional programming such as data science.[348] It is more popular than R, especially for natural language processing (NLP), but its list of libraries and applications for statistical analysis are less extensive. These capabilities are growing with the expansion of libraries and packages available to apply data science and machine learning techniques. NumPy, Pandas, Matplotlib, Scipy, PyTorch, and scikit-learn are useful for applying data science principles to transform, model, develop, and run machine learning algorithms for tasks like classification, clustering, and regression.[349]

f.   *Considerations*

There are two considerations worthy of discussion regarding software selection. In a situation akin to Civil Affairs utilizing several programs of record for CIM to leverage the strengths of each, the open-source community often has several programs that perform similar functions with nuanced differences. In the case of R and Python, it might be beneficial to develop proficiency in both languages to maximize the strengths of each.[350] Attempts to standardize software selections and analytic techniques in rapidly changing environments are likely to fail due to the flexibility needed to be successful in these environments. As Blanken and Overbaugh described the flexibility of management,

---

[348] Jun Wu, "Python vs. R — Choosing the Best Programming Language for Data Science," *Medium*, June 25, 2019, https://towardsdatascience.com/python-vs-r-choosing-the-best-programming-languages-for-data-science-b1327f01f6bf.

[349] Oleksii Kharkovyna, "A Beginner's Guide to Python for Data Science," *Medium*, July 16, 2019, https://towardsdatascience.com/a-beginners-guide-to-python-for-data-science-60ef022b7b67.

[350] DataCamp, "Choosing Python or R for Data Analysis? An Infographic," DataCamp Community, January 9, 2020, https://www.datacamp.com/community/tutorials/r-or-python-for-data-analysis.

continuing education, and competence requirements for adhocracies, the use of several analytical techniques and platforms might be necessary to achieve the preferred outcome.[351]

The second point worthy of highlighting is the fact that the open-source community is collaborative and always learning.[352] Support can be found on forums such as Stack Overflow that provide responses from the experts in the community. CA analysts could leverage this collaborative environment to support the need for evolving analytical techniques while lessening the need to hire outside support or contractors.

(1) Exploratory Analysis and Confirmatory Analysis

Exploratory analysis is used to develop a familiarity with data.[353] It is quintessentially exploring the depths of data through visualizations to determine if patterns, trends, or outliers warrant further attention. Visualizations help analysts by expanding their working memory and aids in generating new questions and insights. Confirmatory analysis is hypothesis testing. After generating new hypotheses, confirmatory analysis either rejects or accepts the null hypothesis revealing the statistical significance of relationships or models. It is important to develop the capacity for both types of analysis. All exploratory analysis requires confirmatory analysis to confirm the hypothesis generated during exploratory analysis.

(2) Statistical Models

There are several statistical techniques that CA analysts may use to confirm or reject the existence of statistically significant relationships and their strength. These statistical techniques are also used to assess models and their goodness of fit in explaining the distribution of data. Data science makes these statistical procedures easier to explore with the aid of visualizations. In visualizing the distribution of data, analysts can make

---

[351] Blanken and Overbaugh, "Looking for Intel?," 565–66.

[352] Sean Everton and Daniel Cunningham, "Introduction to R for SNA" (Lecture, Dynamic Network Analysis, Naval Postgraduate School, September 30, 2019).

[353] Daniel Cunningham, "Day 3 - Data Visualization" (PowerPoint, Visual Analytics, Naval Postgraduate School, July 16, 2019).

assessments about which types of relationships better represent the data and the environment.

(3)   Linear Regression Models

Regressions are a statistical method of measuring the correlation between independent (explanatory) variables and a dependent (response) variable in models.[354] Models allow researchers and analysts to determine which variables are relevant in explaining the response in others. Consequently, models allow researchers and analysts to make predictions of future expected outcomes based on the analysis of prior observations. Regression models come in many forms and range in complexity from univariate, bivariate, and multivariate models that test the relationships between a specified number variables in the model.[355] Essentially, in multivariate regression models, machines a draw a line through multidimensional space to determine the slope with the least error between the interactions of independent variables and their effect on the response variable. These mathematical procedures determine the line and model that best fits the data, which may vary depending on the distribution of observations. Without visualizing the resulting model, however, it is difficult to assess the relationship that best fits the data. Anscombe's Quartet, depicted in Figure 19, demonstrates this point and serves as a great example of why visualization is necessary to support effective modeling.[356]

---

[354] P. Sabine and Charles Plumpton, *Statistics*, eBook, Core Books in Advanced Mathematics (London: Palgrave Macmillan UK, 1985), 54–84.

[355] George H. (George Henry) Dunteman and Moon-Ho R. Ho, "Classical Multiple Regression Model," in *An Introduction to Generalized Linear Models*, Quantitative Applications in the Social Sciences 145 (Thousand Oaks, Calif: Sage Publications, 2006), 11–18, https://dx.doi.org/10.4135/9781412983273.

[356] Vikram Dayal, "Anscombe's Quartet: Graphs Can Reveal," in *An Introduction to R for Quantitative Economics: Graphing, Simulating and Computing* (New Delhi: Springer India, 2015), 59–63, https://doi.org/10.1007/978-81-322-2340-5_9; F.J. Anscombe, "Graphs in Statistical Analysis," *The American Statistician* 27, no. 1 (1973): 17–21, https://doi.org/10.1080/00031305.1973.10478966.
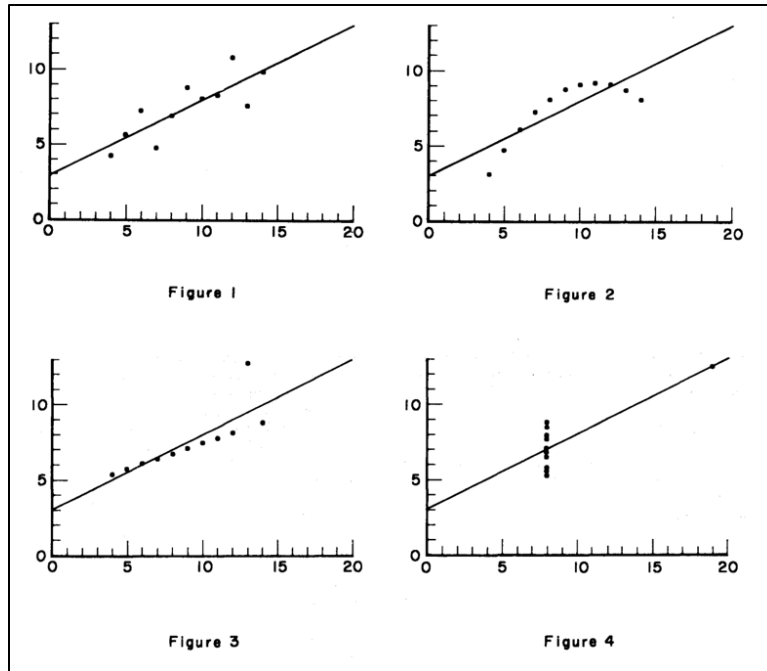
Anscombe's Quartet is significant because it demonstrates the same model (slope) based on the assumption of a linear relationship for the data distributions of all four figures. While Figure 1 shows a model correctly assuming a linear relationship, Figure 2 shows a situation where the analyst should consider a quadratic model to fit the data. Similarly, Figures 3 and 4 demonstrate the effects of outliers and skewed distributions the on the model, which leads to suboptimal representations of the data.

Figure 19.   Anscombe's Quartet[357]

(4)   Logistic Regression Models

Logistic regressions evaluate categorical dependent variables with binomial distributions, meaning the predicted value of the dependent variable is a probability.[358] Logistic regressions test the probability of an event occurring in a binary way, either the event occurs or it does not occur. Logistic regressions are particularly useful for assessing

---

[357] Source: Anscombe, "Graphs in Statistical Analysis." Figures 1–4.

[358] George H. (George Henry) Dunteman and Moon-Ho R. Ho, "Logistic Regression," in *An Introduction to Generalized Linear Models*, Quantitative Applications in the Social Sciences 145 (Thousand Oaks, Calif: Sage Publications, 2006), 36–43, https://dx.doi.org/10.4135/9781412983273; Richard J. Rossi, "Generalized Linear Models," in *Mathematical Statistics* (Hoboken, NJ, USA: John Wiley & Sons, Inc., 2018), 334–75.

things such as the predicting the onset of armed conflict or determining the probability of a patrol encountering an improvised explosive device on an operation.[359]

(5) Poisson Regression Models

Poisson regressions assume a different response variable value and distribution.[360] Poisson regressions model count variables.[361] These are variables, such as counts of deaths, that can only take on positive integer values. Such models have potential applications for CA analysts to employ them to study patterns of violence geospatially. For example, a model predicting the number of events that occur in specified grid cells based on preidentified indicators representing independent variables could be of great value to a supported commander assessing the risk to U.S. forces. Two recent theses demonstrate the potential of these methods. Chew and Kuah geospatially modeled the probability of political violence events in Ukraine following the Euromaidan Movement based on the use of social media-derived sentiment metrics.[362] Similarly, Colin Foote modeled the onset of violent events in response to digital shutdowns directed by the Indian government.[363]

7. Risks and Shortfalls

There are several risks associated with developing a data-driven capability. The perverse incentives these methods often produce can yield negative effects on the organization using them. Both Hernandez et al. and PJ Vogt discuss the effect of these

---

[359] Håvard Hegre et al., "Predicting Armed Conflict, 2010–2050," *International Studies Quarterly* 57, no. 2 (2013): 250–70.

[360] Dimitris Karlis and Loukia Meligkotsidou, "Multivariate Poisson Regression with Covariance Structure," *Statistics and Computing*, 205AD, 255–65; Rossi, "Generalized Linear Models," 331–81.

[361] Andrew Lovett and Robin Flowerdew, "Analysis of Count Data Using Poisson Regression," *The Professional Geographer* 41, no. 2 (1989): 190–98.

[362] Weiqi Kuah and Yee Hur William Chew, "Hashtag Warriors: The Influence of Social Media on Collective Violence in Ukraine" (Master's thesis, Monterey, CA, Naval Postgraduate School, 2018), http://hdl.handle.net/10945/61332.

[363] Colin J. Foote, "Digital Repression and Conflict Violence" (Master's thesis, Monterey, CA, Naval Postgraduate School, 2018), http://hdl.handle.net/10945/61367.

risks.[364] One source heavily cited in the CompStat case is the PJ Vogt podcast "The Crime Machine Part I," which discusses the creation of CompStat.[365] The sequel titled "The Crime Machine Part II" discusses the perverse incentives associated with using these analytic techniques over an extended period. Despite the diminishing marginal returns associated with using these analytic techniques, there is a political and public perception that continued use of these methods will translate to a perpetual decrease in crime.[366] To maintain this perception, the NYPD misrepresented the severity of crimes as lesser offenses to keep the crime statistics artificially low. In a similar vein, Hernandez et al. discuss the same problem with assessments of irregular warfare in Afghanistan.[367] They observed a constant effort to show progress, and the pressure to maintain this progress caused the Afghan Assessment Group to change its assessment criteria to maintain the artificial status quo.

The second risk associated with adopting data-driven processes is the organizational change required to secure the return on investment. This sort of organizational change may not be feasible or appropriate as Proctor & Gamble and General Electric discovered.[368] Blanken and Overbaugh suggested this in their response to Flynn et al.'s *Fixing Intel* report.[369] They argue Flynn et al.'s proposed transformation would fail because they would fundamentally alter the design, function, and organizational purpose of the military intelligence establishment, which is to filter and validate intelligence at each command echelon before reaching its political leadership. They argue these changes to the intelligence community require a transition of the intelligence process from a deductive to

---

364 Alejandro S. Hernandez, Julian Ouellet, and Christopher J. Nannini, "Circular Logic and Constant Progress: IW Assessments in Afghanistan," in *Assessing War: The Challenge of Measuring Success and Failure*, ed. Leo J. Blanken, Hy Rothstein, and Jason J. Lapore (Washington, DC: Georgetown University Press, 2015), 214–31; PJ Vogt, "The Crime Machine, Part II," mp4, Reply All, accessed December 2, 2019, https://gimletmedia.com/shows/reply-all/n8hwl7/128-the-crime-machine-part-ii#episode-player.

365 Vogt, "The Crime Machine."

366 Vogt, "The Crime Machine Part II."

367 Hernandez, Ouellet, and Nannini, "Circular Logic and Constant Progress," 216–29.

368 Davenport and Westerman, "Why So Many High-Profile Digital Transformations Fail."

369 Blanken and Overbaugh, "Looking for Intel?," 569–74; Flynn, Pottinger, and Batchelor, *Fixing Intel*.

an inductive approach, which requires radically different personnel selection and training methodologies for military intelligence analysts. The implications of such a transformation are great with respect to the difficulty in its undertaking as well as the suitability of such a task when more efficient solutions exist. Blanken and Overbaugh's discussions parallel the argument for developing CA analysts using data-driven approaches, where the organizational change and effort required to build such a capability may not be worth the investment from a feasibility and suitability standpoint. This insight provides a segue into the third risk which is the organization's ability to adapt and integrate the effects of the new analytic approach.

While the organizational changes recommended by Flynn et al. parallel the central argument of this thesis, CA lacks the rigid bureaucratic structures and specialization of the intelligence community.[370] After a careful reading of Blanken and Overbaugh's argument, the establishment of a potent CA analytic capability seems to be the missing link in the military intelligence equation.[371] Despite these insights, implications exist for introducing these types of data-driven approaches into highly structured and bureaucratic information environments such as military commands. Military commands must learn how to interact and integrate the insights from the data-driven approaches. Hernandez et al.'s chapter of *Assessing War* provides a clear example, wherein the conclusion they argue: "New data is often treated as additional data for collection and not as different data. A data-centric focus to IW can quickly overwhelm other parts of the planning process."[372] Therefore, the intent is to not introduce competing data that might overwhelm the information flows existing within a military command. This new data must form a symbiotic relationship with the information already understood within the standardized military command information ecosystem. For the same reasons, Blanken and Overbaugh argued that the inefficiencies at higher echelons of the military intelligence apparatus are a product of bureaucratic design.[373] They suggest that changing the organizational design would conflict with their

[370] Flynn, Pottinger, and Batchelor, *Fixing Intel.*

[371] Blanken and Overbaugh, "Looking for Intel?"

[372] Hernandez, Ouellet, and Nannini, "Circular Logic and Constant Progress," 228.

[373] Blanken and Overbaugh, "Looking for Intel?," 565–74.

purpose and overwhelm the political leadership with a deluge of unfiltered information. Thus, the risk of overwhelming the information flows within established organizations is significant and any new analytic capability must delineate its outputs accordingly. One way to achieve this delineation is to target the higher-order operational targeting and strategy development to reduce the complexity of other planning and operations tasks.

B.   SOCIAL NETWORK ANALYSIS

> Responding to networked crime groups will require new and innovative responses. Such traditional responses as 'counterleadership targeting' (e.g., the takedown of Pablo Escobar or attempts to capture Osama Bin Laden) have dominated strategy to date, with little long-term effect. Networked groups are resilient. Their organizational flexibility allows them to absorb such shocks and rechannel their efforts to remain intact. This organizational ambiguity frustrates hierarchical organizations, since their efforts to contain the opposing criminal forces are frequently too rigid or too slow to stop these adversaries.

> —John Arquilla and David F. Ronfeldt[374]

1.   What Is Social Network Analysis?

Arquilla and Ronfeldt argue in *Networks and Netwars: The Future of Terror, Crime, and Militancy* that social network analysis is a useful tool in analyzing networks and developing strategies to disrupt adversarial networks and organizations. Developed by social psychologists, organizational sociologists, and "pursued by anthropologists, sociologists, and organizational theorists," social network analysis (SNA) offers a contrast to the prevailing perspective.[375] The underlying premise in SNA is that an actor or organization's power and influence is derived from their location within the social structure of the network. Hence, Cunningham's focused definition, "social network analysis is a set of theories and techniques to understand social structure visually and statistically."[376] In

---

[374] Arquilla and Ronfeldt, *Networks and Netwars*, 123–24.

[375] Arquilla and Ronfeldt, 316.

[376] Daniel Cunningham, "Link Analysis vs. Social Network Analysis" (PowerPoint, Visual Analytics, Naval Postgraduate School, August 22, 2019), 4. Cunningham, 4.

contrast with prevailing approaches, individual attributes are less relevant in SNA. Arquilla and Ronfeldt write,

> In this view, power and influence depend less on one's personal attributes (e.g., resources, attitudes, behaviors) than on one's interpersonal relations—the location and character of one's ties in and to the network. The "unit of analysis" is not so much the individual as it is the network in which the individual is embedded. Not unlike complexity theorists, social network analysts view a network as a systemic whole that is greater than and different from its parts. An essential aim is to show how the properties of the parts are defined by their networked interactions, and how a network itself functions to create opportunities or constraints for the individuals in it.[377]

The key takeaway from Arquilla and Ronfeldt's passage is that the social structure of networks, when viewed as a system, convey meaning useful to analysts and researchers. Analysts and researchers derive this meaning from an actor's position within a sociogram, which is the visual representation of the network's structure, and the results of the SNA measures. An actor's location is determined by a combination of a analyst-specified algorithm and the relational inputs of the network. In other words, the social space between actors is not random. It is determined by their pattern of their relationships. Algorithms place actors sharing numerous ties closer together and actors without ties further apart.

2.   Key Assumptions

SNA is set of theories and techniques built on some key assumptions. In their work *Understanding Dark Networks: A Strategic Framework for the Use of Social Network Analysis*, Cunningham et al. describe the following assumptions:

- Ties between actors function as conduits for the transfer or flow of information, sentiment, material and/or nonmaterial goods, or other resources (e.g., funds, supplies, information, trust, and enmity).
- Actors, along with their actions and motivations, are interdependent, rather than independent, with other actors.
- A network's social structure reflects enduring patterns of interaction between actors.
- An actor's position in the social structure impacts his or her beliefs, norms, and behavior.

---

[377] Arquilla and Ronfeldt, *Networks and Netwars*, 317.

- Repeated interactions between actors give rise to social configurations that take on a life of their own and cannot be reduced to constituent components even though actors remain dependent upon those components.
- Social networks are dynamic and responsive to changes in the actors, sub-groups, and ties between actors.[378]

These assumptions are relevant because they embody the social science upon which social network analysis is based.[379] They give meaning to the ties between actors, social processes driving tie formation, and the tie's function in the network. These points aid in the interpretation of sociograms and measures of network topography and centrality. As such, these key points carry significant implications for use by CA elements conducting CAO. Detecting subgroups and investigating patterns of ties will be useful in predicting how a network might function or predicting recruitment rates of irregular threats. Thus, it is not only important to understand the metrics of social network analysis, but also the theories supporting the measures and their meaning.

3.   Benefits over Existing Analytical Methods in Civil Affairs

CA analysts use several analytical techniques to understand the civil component of their operating environment, but Liddick et al. identify the prevailing method of civil network analysis as link analysis.[380] Cunningham et al. add that analysts use the systems analysis techniques prescribed in CA doctrine, such as nodal analysis, which serve as inputs for link analysis.[381] While Cunningham et al. concede that link analysis is useful in visualizing the operational environment, they argue that its utility is limited to the benefits of visualization. They define link analysis as, "the visual depiction of relations among entities."[382] These entities may include actors, entities, and things such as locations,

[378] Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 13.

[379] Cunningham, Murphy, and Everton, 13.

[380] Liddick, Dickerson, and Chung, "Calibrating Civil Affairs Forces for Lethality," 2; Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 7.

[381] Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 7.

[382] Cunningham, "Link Analysis vs. Social Network Analysis," 4; Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 7.

events, and physical objects. In other words, link analysis is a multi-modal analytical tool that constitutes a relational depiction of the network and known operational environment with the placement of nodes decided by analysts.

In contrast with link analysis, SNA offers several benefits to CA analysts in the form of visualizations, data quality, and mathematical inferences. Cunningham notes that SNA visualizations, known as sociograms, are the product of algorithms that determine the social space between actors.[383] Algorithms place actors with common ties closer together and actors without common ties further apart, thereby producing a visualization whose structure implies meaning based on the pattern of relationships. Thus, the algorithms provide a relative form objectivity with respect to node placement and social space. Everton proposes an additional benefit exists as multiple algorithms allow analysts to view the network from multiple perspectives revealing connections and structures of interest.[384]

4.   Applications

In his book *Disrupting Dark Networks*, Sean Everton provides numerous examples of SNA's utility in both understanding and disrupting dark networks.[385] He suggests, "SNA has enhanced our understanding of how dark networks organize themselves and has offered potential strategies for their disruption."[386] The application of SNA towards understanding and disrupting irregular threats is growing. In Valdis Kreb's "Mapping Networks of Terrorist Cells," he assessed the Hamburg Cell that perpetrated attacks on the World Trade Center and Pentagon on September 11, 2001.[387] Stephen Koschade's analysis of Jemaah Islamiyah laid out a framework for understanding terrorist cells and demonstrated its utility writing, "Such a framework will assist in (1) understanding the

---

[383] Cunningham, "Link Analysis vs. Social Network Analysis," 4. Cunningham, 4.

[384] Everton, *Disrupting Dark Networks*, 49.

[385] Everton, xxviii–xxx.

[386] Everton, xxviii–xxix.

[387] Valdis Krebs, "Mapping Networks of Terrorist Cells," *Connections*, no. 24 (2002): 43–52.

communication and structure of such cells and (2) assist in predicting the likely outcomes of terrorist cells when employed in real-time intelligence analysis."[388]

In moving beyond the application of SNA towards the study of irregular threats, there are a few examples of its operational effectiveness against irregular threats, particularly in the use of non-kinetic approaches. Everton mentions two successful cases referring to operations in northern Iraq and Singapore using Psychological Operations to implode an insurgent network and rehabilitation and reintegration strategy to return terrorists back to society.[389] Perhaps the greatest utility of applying SNA towards irregular threats lies in developing strategies for their defeat. In their article "Strategies for Combating Dark Networks," Everton and Roberts suggest using both kinetic and non-kinetic approaches including "targeting, organizational targeting, capacity-building, institution building, psychological operations, information operation, and rehabilitation."[390] Using SNA to inform U.S. strategies based on the assessments of irregular threat network structures is consistent with the data-driven approaches examined in this research. The current process decision makers use to develop strategies are entirely subjective without rigorous, transparent means of assessing effectiveness.[391]

Chaves et al. and Hayes and Nguyen illustrated another potential use of SNA.[392] Chaves et al. illustrates the utility in using SNA to assess UAP networks best postured to support North Korean populations in the event of large-scale combat operations on the Korean peninsula. Hayes and Nguyen applied SNA to assess the power of the CA network including units, partners, and stakeholders in the community. Both of these projects displayed the potential application of SNA for the assessment of networks internal to CA to identify which relationships are the most relevant and useful.

---

[388] Koschade, "A Social Network Analysis of Jemaah Islamiyah," 559.

[389] Everton, *Disrupting Dark Networks*, xxix.

[390] Everton and Roberts, "Strategies for Combating Dark Networks," 4–6.

[391] Hernandez, Ouellet, and Nannini, "Circular Logic and Constant Progress," 219–31.

[392] Chaves, Christmas, and Sloulin, "Humanitarian Assistance on the Korean Peninsula"; Hayes and Nguyen, "CA 2025."

Social Network Analysis is certainly a missing component to the Civil Affairs analytic capability. As noted in the literature review, SNA is conspicuously absent from the *Civil Affairs: 2025 and Beyond* and "Civil Affairs Force Modernization Assessment," which is odd because the CA branch has speculated about incorporating SNA into CIM since 2015.[393] SNA offers CA the potential to quantify and test its subjective assessments of the operational environment. CA should use SNA to assess itself, its network of UAPs, and the social structures of its operational environment, especially the socio-political and political-military networks.

Many associate SNA with lethal targeting, yet Everton and Roberts contend that SNA is even better-suited to informing indirect strategies.[394] However, CA's use of SNA should not be limited to indirect strategies. CA elements should use SNA for assessing the potential effectiveness of potential kinetic targeting strategies. Partners within their network must understand the ramifications of their intended strategies across multiple networks. If Civil Affairs elements remain largely excluded from participating in kinetic targeting processes, then the Joint Force will continue to perpetuate the status quo blind spot that both Krohley and Flynn et al. reference in their articles and report.[395] More importantly, it perpetuates the perspective that threat networks exist apart from the societies that support them. While *Countering Threat Networks* provides four engagement strategies for countering threat networks, three are kinetic.[396] Commanders pursuing these strategies must understand when decapitation strikes and network fragmentation actions possess a greater potential for achieving the desired effects and when these actions will mobilize socio-political networks against their purposes. SNA possesses the potential for providing these types of insights to reduce the uncertainty associated with these fateful decisions.

---

[393] U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, *Civil Affairs: 2025 and Beyond*; U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, "CA FMA"; Hayes and Nguyen, "CA 2025," 55–57, 98.

[394] Everton and Roberts, "Strategies for Combating Dark Networks," 3–4.

[395] Krohley, "Moving Beyond the Post-9/11 Manhunt," 5–9; Flynn, Pottinger, and Batchelor, *Fixing Intel*, 7.

[396] Office of the Joint Chiefs of Staff, *Countering Threat Networks*, V-8-V–9.

5.   Components of the Analytical Method

The analytical methods behind SNA depend on a number of components including methodology, software, coding data, and developing an understanding of the metrics and how they inform strategies. For the purposes of this research, establishing a baseline of understanding is sufficient to outline what an initial operating capability would include to provide SNA as an analytics competence.

a.   *SNA Metrics and Approaches*

Any CA SNA capability must include a working knowledge of the SNA metrics. In *Understanding Dark Networks: A Strategic Framework for the Use of Social Network Analysis*, Cunningham et al. suggest developing a working knowledge in the following topics:

- Collecting Coding, and Manipulating Social Network Data
- Network Topography
- Cohesion and Clustering
- Detecting Subgroups
- Centrality Power and Prestige
- Brokers and Bridges
- Structural Equivalence
- Hypothesis Testing[397]

They cover these topics in his book extensively using a conceptual approach, whereas Everton takes a different approach when he suggests developing a working knowledge on the same topics from a practical perspective using SNA software and datasets in a step-by-step process in *Disrupting Dark Networks*.[398]

Cunningham et al. suggest that collecting, coding, and manipulating network data is essential for the practice of SNA.[399] These processes determine the validity and reliability of an analyst's data. Cunningham et al. continue noting network topography

---

[397] Cunningham, Murphy, and Everton, *Understanding Dark Networks*.

[398] Everton, *Disrupting Dark Networks*.

[399] Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 35–83.

addresses the structure of the network, such as its centralization, diameter, and average path distance.[400] They describe cohesion and clustering as measures to determine the connectivity within a network and how resistant it is to fragmentation, while detecting subgroups evaluates the patterns of ties between actors and determines whether there are groups of nodes with stronger internal ties than external ties within a network.[401] There are multiple algorithms that identify subgroups and their identification is useful in isolating the affiliations for further study.

Cunningham et al. consider centrality, power, and prestige as well as brokers and bridges, which are SNA measures of power and influence.[402] These measures are determined by the social structure of the network. Structural equivalence focuses on the patterns of ties and identifies actors of similar stature based on their patterns of ties within a network. Lastly, Cunningham et al. explore hypothesis testing, which offers methods for evaluating networks using a variety of statistical applications, models, and procedures to determine whether a network structure formed as a product of random chance or whether the network and tie formation is attributed to certain exogenous or endogenous factors.[403] A competent knowledge of these metrics and approaches will greatly enhance the understanding of target networks and the social processes underlying the formation of relationships between actors or organizations.

The SNA workflows Cunningham et al. suggest isolate research questions and emphasize the proper amount of preparation to ensure the validity of data to enable more advanced SNA techniques of hypothesis testing such as Exponential Random Graph

---

[400] Cunningham, Murphy, and Everton, 85–138.

[401] Cunningham, Murphy, and Everton, 85–138.

[402] Cunningham, Murphy, and Everton, 144–92.

[403] Cunningham, Murphy, and Everton, 223–64.

Models (ERGM) and Stochastic Actor Oriented Models (SAOM).[404] Essentially, if the analysts did not apply the proper amount of analysis in preparation phase of the methodology, it is pointless to apply more advanced measures. The quality of analysis depends on the quality of the data.

b.   *Software*

There are multiple applications available to perform SNA. Each has its own individual level of user friendliness, network size limitations, file types, and style of visualizations. They vary in capabilities as some can perform time-series calculations while others cannot. The use of multiple applications is common because benefits offered in differing visualization and capabilities. The most popular SNA software includes the following applications: UCINet and NetDraw, Organizational Risk Analyzer (ORA), Pajek, Gephi, and various SNA packages in R.

Gephi is an open-source SNA tool capable of producing stunning visuals and processing large network files up to roughly one million nodes and edges. Cunningham et al. note that the Gephi Consortium, a French non-profit organization, owns Gephi.[405] The software is available for use across Mac, PC, and Linux systems. Due to its open-source nature, developers regularly update Gephi to include new methods and measures in the form of plugins. Gephi's website is a forum for learning and collaboration as it contains journal articles and training videos to help others build SNA skills.[406] Gephi is available in several languages including English, Spanish, French, and Japanese, which makes is

---

[404] ERGM allow researchers employing SNA to test theories of social processes that contribute to tie formation in specified networks. ERGM are particularly valuable because they allow analysts to attribute tie formation to either endogenous or exogenous factors such as reciprocity or attributional factors such as language. Cunningham et al. suggest "SAOM are similar to ERGM [yet] assume that the observed network structure is a function of local pattern of ties." Dean Lusher, Johan Koskinen, and Garry Robins, eds., *Exponential Random Graph Models for Social Networks: Theory, Methods, and Applications*, vol. 35, Structural Analysis in the Social Sciences (New York, NY: Cambridge University Press, 2012); Tom A.B. Snijders, Gerhard G. van de Bunt, and Christian E.G. Steglich, "Introduction to Stochastic Actor-Based Models for Network Dynamics," *Social Networks* 32, no. 1 (2010): 44–60, https://doi.org/10.1016/j.socnet.2009.02.004.; Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 245–89.

[405] Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 333.

[406] Gephi, "Learn How to Use Gephi," Gephi, accessed February 19, 2020, https://gephi.org/users/.

attractive for sharing information with international partners and organizations outside of the U.S. government. However, Cunningham et al. offer that Gephi lacks certain measures as well as poses unique challenges to working with multiplex data.[407]

Initially developed at the University of California Irvine, UCINet and NetDraw come together in same package from Analytic Technologies, which is owned by Steve Borgatti.[408] While technically a standalone program with some limited capacity, NetDraw functions as a component of UCINet. These applications are only available in English and for computers running Microsoft Windows. UCINet composes the core of the software where analysts input, transform, and manipulate their network data. NetDraw's core function is to visualize network data using various algorithms available in the application. Despite a few nuances, UCINet is user-friendly, but limited in the size of network files it can process in comparison to its competitors ORA, Pajek and Gephi. The other drawback is that it does not handle time-series data like ORA and Pajek.

ORA is a powerful SNA software program developed by Kathleen Carley at Carnegie Mellon University. ORA is available for use on both PC and Mac platforms.[409] It is capable of processing large network datasets, calculating a variety of network measures, and visualizing network data. As Cunningham et al. point out, ORA differs from other SNA programs since it produces reports containing multiple network measures instead of one network measure specified by the user.[410] They note this peculiarity is the source of one of the software's weaknesses, which is ORA's "Standard Network Analysis" reports may contain inappropriate metrics and measures with specific network data such as

[407] Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 333.

[408] Steve Borgatti, M.G. Everett, and L.C. Freeman, *UCINet 6 for Windows: Software for Social Network Analysis*, version 6, Windows (Harvard, MA: Analytic Technologies, 2002); Steve Borgatti and Roberta Chase, "About Our Company," Analytic Technologies, accessed January 19, 2020, http://www.analytictech.com/about.htm; Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 333–34.

[409] Kathleen M. Carley, "ORA-LITE: Software," Computational Analysis of Social and Organizational Systems (CASOS), January 31, 2020, http://www.casos.cs.cmu.edu/projects/ora/software.php.

[410] Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 334–35.

calculating the closeness centrality of disconnected networks.[411] While Cunningham et al. characterize ORA's visualization capabilities as adequate, ORA provides clean visualizations which is especially useful when working with social media-derived network data.

Developed by Andrej Mrvar and Vladimir Batagelj at the University of Ljubljana in Slovenia, Pajek is a powerful SNA program designed for the analysis of very large networks.[412] Pajek is free for non-commercial use and available on Mac, Linux, and Windows.[413] Pajek is capable of processing and drawing network data containing nearly a billions vertices.[414] Pajek is less user-friendly than other SNA applications due to its nuanced inputs and lack of user interface menus. It retains a simple user interface that requires time for users to develop proficiency. Despite the nuances, Pajek is one of the most capable SNA programs for visualizing networks of all sizes.

Cunningham et al. describe R as "a programming language and software environment for statistical computing and graphics that is widely used among statisticians for developing statistical software and data analysis, including social network analysis."[415] As stated above, R is available on Mac, Linux, and Windows operating systems and

---

[411] The network measure of closeness centrality cannot be calculated on disconnected networks. In such circumstances the appropriate network measure to use is Alternative Reciprocal Distance, known as ARD. ARD is the preferred metric because it allows users to calculate closeness centrality incorporating all network data without the need for complicated data or algorithm modifications. Borgatti calculated ARD using the sum and average of all reciprocal distances between all actors in the network. Linton C. Freeman, Douglas Roeder, and Robert R. Mulholland, "Centrality in Social Networks: II. Experimental Results," *Social Networks* 2, no. 2 (1979): 119–41, https://doi.org/10.1016/0378-8733(79)90002-9; Stephen P. Borgatti, "Identifying Sets of Key Players in a Social Network," *Computational & Mathematical Organization Theory* 12, no. 1 (April 2006): 21–34, https://doi.org/10.1007/s10588-006-7084-x; Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 144,151.

[412] Andrej Mrvar and Vladimir Batagelj, *Pajek, PajekXXL, Pajek3XL: Programs for Analysis and Visualization of Very Large Networks Reference Manual*, Version 5.8 (Ljubljana, 2019), http://mrvar.fdv.uni-lj.si/pajek/pajekman.pdf.

[413] Andrej Mrvar and Vladimir Batagelj, "Pajek / PajekXXL / Pajek3XL," Software, Pajek - Program for Large Network Analysis, 2003, http://mrvar.fdv.uni-lj.si/pajek/.

[414] Wouter de Nooy, Andrej Mrvar, and Vladimir Batagelj, Exploratory Social Network Analysis with Pajek: Revised and Expanded Edition For Updated Software, Exploratory Social Network Analysis with Pajek, 3rd Edition, vol. 46, Structural Analysis in the Social Sciences (New York, NY: Cambridge University Press, 2018).

[415] Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 336.

contains over 15,000 packages.[416] Cunningham et al. list the two most useful packages as *statnet* and *igraph* as well as other standalone packages such as *RSiena*, which allow users to estimate SAOMs of their network data.[417] While they comment on the power and utility of these packages, Cunningham et al. believe most users will opt for other SNA software options due to the difficulty of learning and using these packages in R compared to other software options.

6. Operational Challenges and Risk

Cunningham et al. also warn readers not to view SNA as a panacea.[418] Everton echoes the same point when he suggests, "SNA is not a silver bullet in the fight against terrorism and criminal networks but rather one tool that can be used in conjunction with other tools in the crafting of potential strategies."[419] SNA is a powerful analytical tool to help make decisions, but it has limits. Researchers encounter three common challenges when evaluating dark networks using SNA. These problems include "the dynamic and evolving nature of networks, incompleteness of data, and fuzziness of boundaries"[420] In the process of coding relationships, Krebs argues it is difficult to determine which actors to include in a dark network, which are covert by nature.[421] He argues that the process is not impossible, but it requires great effort to mitigate.

---

[416] The Comprehensive R Archive Network, "Download and Install R," Data, The Comprehensive R Archive Network (CRAN), 2019, https://cran.r-project.org/; The Comprehensive R Archive Network, "Contributed Packages," Data, The Comprehensive R Archive Network (CRAN), 2019, https://cran.r-project.org/.

[417] Mark S. Handcock et al., "Statnet: Software Tools for the Representation, Visualization, Analysis and Simulation of Network Data," *Journal of Statistical Software* 24, no. 1 (July 10, 2008): 1548–7660, https://doi.org/10.18637/jss.v024.i01; Gabor Csardi and Tamas Nepusz, "The Igraph Software Package for Complex Network Research," *InterJournal, Complex Systems* 1695, no. 5 (2006): 1–9; Ruth M. Ripley et al., "Manual for RSIENA," *University of Oxford, Department of Statistics, Nuffield College* 1 (2011), http://www.stats.ox.ac.uk/~snijders/siena/RSiena_Manual.pdf.

[418] Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 3.

[419] Everton, *Disrupting Dark Networks*, 365.

[420] Cunningham, Murphy, and Everton, *Understanding Dark Networks*, xviii.

[421] Valdis Krebs, "Mapping Networks of Terrorist Cells," 44–46.

Everton and Roberts highlight another issue with using SNA as a means for assessing resistance movements and opposition groups in their article "Monitoring and Disrupting Dark Networks: A Bias toward the Center and What it Costs Us."[422] They claim that the natural biases of emphasizing measures of centrality, leadership, and visual biases tend to drive analysis. In the case of the Syrian Opposition Network, Everton and Roberts suggest these biases blinded analysts from other actors in the network that aligned themselves with the Islamic State of Syria. They mention that clustering algorithms are helpful in mitigating these biases, but they suggest "it is important to not confuse centrality measures with importance and importance with leadership."[423] They recommend using all of the tools in the SNA toolbox to evaluate the entire network to mitigate these cognitive biases.

---

[422] Sean Everton and Nancy C. Roberts, "Monitoring and Disrupting Dark Networks A Bias toward the Center and What It Costs Us," *Middle East Review of Public Administration* 2, no. 1 (2016): 1–18.

[423] Everton and Roberts, 12.

VI.   RECOMMENDATIONS

This research offers several recommendations based on the analyses of the literature review, case studies, current CA analytical capabilities, and innovative tools and techniques required to enhance the objectivity, sophistication, and effectiveness of CA's analytical capabilities. These recommendations aim to facilitate the following actions:

1.   Transition Civil Affairs Branch from an expertise-driven to a data-driven organization capable of leveraging the data it collects.

2.   Enable assessments of CA forces' assumptions and activities in order to ascertain which investments and actions are profitable.

3.   Use data as a conduit to form better questions about the operational environment.

This research provides the following baseline recommendations for retooling CA analytical capabilities for the future operating environment:

1.   Focus on analysis to generate knowledge in the form of insights.

2.   Focus on integrating insights into sophisticated targeting frameworks and strategies.

3.   Design this analytic capability around its core functions and expected operating environment using the principles of efficiency and effectiveness.

4.   Select and train personnel from within the Civil Affairs Branch with an aptitude for analysis to serve as analysts.

The remaining recommendations fall into two broad categories. The first set of recommendations focuses on its theoretical applications, techniques, and purpose, while the second concern the structure and placement of this proposed Civil Affairs analytic capability.

A. RECOMMENDED ANALYTICAL TECHNIQUES AND APPLICATIONS

This research recommends several analytic techniques to provide CA analysts with the tools they require to reach evidence-based conclusions about their operating environment. The following recommendations concern the type of analysis and techniques CA analysts should employ to gain insights into the civil component of their operational environments:

- Develop proficiency in relational, geospatial, temporal, and lexical analysis techniques

- Develop proficiency in analytic techniques that enable cross-domain analysis of the operational environment

- Develop proficiency in using open-source data analysis software such as R and Python

- Prioritize the use of social network analysis in the evaluation of both friendly and adversarial networks

- Leverage the use of open-source datasets and supplement these datasets with partner and classified information

- Build Application Programming Interfaces (API) into technology-enabled systems used for CIM to extract datasets for analysis in other systems

- Utilize rigorous and transparent statistical modeling techniques to evaluate the efficiency and effectiveness of proposed strategies

CA analysts with operational experience in specific regions possess context that will shape their perspective and research questions. Any future CA analytical capability must leverage open-source data analysis techniques, social network analysis, geospatial analysis, temporal analysis, and lexical analysis to understand the operational environment. CA analysts must select appropriate analytical methods (i.e., relational, geospatial, temporal, or lexical analysis) depending on their problem statements and subsequent

148

research questions. Many of these datasets are so large that they do not make sense in their raw form; thus, CA analysts must utilize open-source data analysis techniques to visualize the data and provide a sufficient, intuitive understanding of the operational environment. This exploratory analysis reveals patterns that may be worthy of testing using explanatory analysis techniques (i.e., confirmatory analysis or hypothesis testing).

1. Use Open-Source Data Analysis to Model Violence and Allocate Resources

Yager focuses on one major topic of interest for the Civil Affairs Branch in his article "Setting the Civil Affairs Analytic Foundation."[424] He suggests that Civil Affairs should start evaluating the effects of U.S. operations on areas and people of interest.[425] He recommends organizing several variables into like units of analysis (e.g., country-year, region-month, or city-day) to run regressions and correlate variable indicators. The variable indicators include public perception using surveys or polls, pattern of life activities, market activities, demonstrations, security events such as small arms fire or detonation of IEDs, threat reporting or criminal activity increases, and engagements with official or traditional leaders. Given these variables, it may be possible to more accurately assess the probability of ambushes or attacks based on the results of logistic regression models. Analysts may use these models to allocate intelligence, surveillance, reconnaissance (ISR) and close air support (CAS) assets to units based on the probability of receiving enemy contact.

Another use for leveraging open-source data analysis is to assess the effects of aid saturation in specific areas during clear, hold, and build operations. As operations persist in the joint area of operations, the presence of U.S. forces and their partners disrupt the local economy. Food aid displaces regular agricultural activity within local markets because the additional supply keeps the market price artificially low. CA elements must model these market inefficiencies to regulate the flow of aid into areas affected by military operations. Without some mechanism to support these parties, the presence of U.S. forces may create a net negative effect for local farmers and their families.

---

[424] Yager, "Setting the Civil Affairs Analytical Foundation."

[425] Yager.

2. Focus on the Connections between Threat Networks and Society

In a similar argument, Krohley argues that CA forces should focus their attention on the socio-political structures that support irregular threats.[426] Krohley claims that the current methods U.S. forces use to target threat networks set them apart from the civil populations that support them. In targeting the conduits that enable irregular threat activities, or their connections into society, CA may be able to disrupt access to the conduits supporting the political causes driving the violence. Koschade also captured this in his framework for analyzing the Noordin Mohammad Top terrorist networks of Jemaah Islamiyah when he found that school ties were the source of the trust network underlying the overall terrorist network.[427]

3. Use SNA Measures as Assessment Metrics

Traditionally, CA forces struggle to measure and articulate the value of their outputs, which many suggest leads to a perception of skepticism and contempt from commanders and institutions competing for resources.[428] Two factors contribute to this reality, the lack of easily quantifiable outputs and ambiguous definition of CA operations, actions, and activities (OAA). First, measuring influence is not an easy task. As Blanken and Lepore describe in "Principals, Agents, and Assessments," measuring influence ranks among one of the most challenging tasks associated with complex environments.[429] While most U.S. military specialties possess the luxury of measuring input activity as outputs, CA forces remain in a state of continuously selling itself and its capabilities. Second, the ambiguous definition and circular logic associated with CAO makes it difficult to define

---

[426] Krohley, "Moving Beyond the Post-9/11 Manhunt."

[427] Koschade, "A Social Network Analysis of Jemaah Islamiyah"; Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 308–25.

[428] Ordiway, "Beyond Tacit Approval"; Assad A. Raza and Jerritt A. Lynn, "The Future of Civil Affairs: Creating Regimental Order from Chaos," *Small Wars Journal*, accessed December 4, 2019, https://smallwarsjournal.com/jrnl/art/future-civil-affairs-creating-regimental-order-chaos; Donald Vacha, "Civil Affairs 2.0: Breaking the Circular Logic," *Small Wars Journal*, accessed December 9, 2019., https://smallwarsjournal.com/jrnl/art/civil-affairs-20-breaking-circular-logic.

[429] Blanken and Lepore, "Principals, Agents, and Assessment," 8.

what CA forces do.[430] The diversity of CA OAAs makes it difficult for practitioners to reduce them into a simple definition. Despite these difficulties, CA forces recently managed to define their operational roles more formally within the civil engagement and civil reconnaissance framework and find informal metrics of demonstrating their value to the U.S. Army and Joint Force.[431]

In his article "Beyond Tacit Approval," Ordiway argues that CA forces should formally transition their measures of performance towards generating and answering IIRs.[432] While this pathway provides a respected measure of what CA forces provide the military intelligence community, it also presents a conflict of interest to CA's status as a Title 10 activity.[433] Transitioning to an IIR-based measurement of performance framework incentivizes CA forces to pursue generating and answering IIRs, which flirts with Title 50 activity.[434] With the power of CA forces resting in its Title 10 authority status, CA forces should supplement their current assessment practices with other metrics of value such as UAP network power, density, cohesion, and reach.[435] Using SNA measures, CA could measure the power of their network using Metcalfe's law, which assesses the power of networks as the square of connected users, and network density, cohesion, and reach using standard SNA measures.[436] The benefits of using SNA measures to assess CMSE effectiveness include: developing an accurate reflection of the CMSE network, which aligns their incentives to their stated purpose; providing a means to develop more effective operational approaches such as holding capacity building conferences to strengthen ties

[430] Vacha, "Civil Affairs 2.0."

[431] Department of the Army, *Civil Affairs Operations*, 1-3-1–5; Ordiway, "Beyond Tacit Approval."

[432] Ordiway, "Beyond Tacit Approval."

[433] Department of the Army, *Civil Affairs Operations*, 1–2.

[434] Andru E. Wall, "Demystifying the Title 10-Title 50 Debate: Distinguishing Military Operations, Intelligence Activities & Covert Action," *Harvard National Security Journal* 3, no. 1 (2011): 85.

[435] James Hendler and Jennifer Golbeck, "Metcalfe's Law, Web 2.0, and the Semantic Web," *Journal of Web Semantics* 6, no. 1 (2008): 14–20, https://doi.org/10.1016/j.websem.2007.11.008; Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 85–104, 143–63, 169–87.

[436] Hendler and Golbeck, "Metcalfe's Law, Web 2.0, and the Semantic Web."

and enhance UAP network cohesion; and capturing CA effects relevant to SOCOM's CME Program Directives.[437]

4. Use SNA to Preserve Governance Networks

CA forces should use SNA as a means to evaluate governance structures and identify actors that warrant further protection to preserve the legitimacy of the governance networks. One of the critical requirements for any insurgency is to destabilize and delegitimize the existing government. For example, during the Vietnam conflict, the Viet Cong delegitimized the South Vietnamese government through attrition.[438] Jones argues that between 1957 and 1963, the Viet Cong assassinated 4,927 government officials and abducted another 6,032 officials. Losses of this magnitude would represent a staggering blow for any government. Sustaining any level of competency and legitimacy following such losses at the local level would be a significant challenge. The application of SNA identifies actors that require additional protections to preserve the cohesion of friendly networks. At the highest levels, Ahmad Shah Massoud and Yitzhak Rabin serve as excellent examples of political actors with significant legitimate socio-political networks that SNA would identify as worthy of additional protections.[439] These boundary spanners with significant social capital possessed connections not easily replicated or replaced.

Chaves et al. provide another example of preserving governance networks in their Master's thesis titled "Humanitarian Assistance Organizations and their Role in Crisis Response on the Korean Peninsula."[440] Chaves et al. use SNA to show how the political situation between North and South Korea affect the capacities of traditional IGOs and NGOs and illuminate actors capable of providing effective humanitarian assistance if the

---

[437] Department of the Army, *Civil Affairs Operations*, 2–30.

[438] Michael Jones, "Vietnam War (1954-1975): Who Do You Think Is Going to Win? Fight the Narrative!" (PowerPoint, Strategy and War, Naval Postgraduate School, February 22, 2019).

[439] Steve Coll, *Ghost Wars: The Secret History of the CIA, Afghanistan, and Bin Laden, from the Soviet Invasion to September 10, 2001*, Hardcover (New York, NY: Penguin Group, 2004), 8–125; Robert B. Baer, *The Perfect Kill: 21 Laws for Assassination* (New York, NY: Penguin Group, 2014); Jeremy Bowen, "Did Rabin Assassination Kill the Best Chance for Peace?," BBC News, November 4, 2015, sec. Middle East, https://www.bbc.com/news/world-middle-east-34712057.

[440] Chaves, Christmas, and Sloulin, "Humanitarian Assistance on the Korean Peninsula."

Democratic People's Republic of Korea (DPRK) governance structures cease functioning. SNA provided a critical tool in identifying the decisive actors across multiple networks, including education, food and security, logistics, and health networks. Chaves et al.'s example demonstrates the utility of using SNA to provide useful insights into the operational environment. These insights undoubtedly informed contingency planning and strategies for establishing effective humanitarian assistance in the event that the DPRK's governance structures fail.

5.   Emulate Open-Source Datasets with Civil Information Capture

Open-source datasets such as the Armed Conflict Location Event Database (ACLED) provide a useful framework for CA analysts to emulate.[441] It contains lists of events between dyadic actors, a rigorous relationship coding system for analyzing the nature of the violence, and event location data for geospatial analysis.[442] Since the lists are dyadic, analysts can transform them effortlessly into time-series edge lists and node lists for use in social network analysis applications. In other words, ACLED datasets are useful because they permit relational, geospatial, and temporal analysis all from one dataset without much manipulation. For example, the African violence network in ACLED visualized in Figure 20 is the depiction of the violence in Africa after the removal of nodes (vertices) with less than 25 ties using a K-core analysis.[443] K-core analysis is useful to concentrate on the most relevant actors within a subgroup by removing actors without k ties.[444] In other words, interactions occurring less than 25 times between actors were excluded from the graphic to concentrate on enduring violence between parties. Ties are also known as *edges* for undirected data and *arcs* for directed data sets.[445] Figure 20

[441] Clionadh Raleigh et al., "Introducing ACLED: An Armed Conflict Location and Event Dataset: Special Data Feature," *Journal of Peace Research* 47, no. 5 (September 1, 2010): 651–60, https://doi.org/10.1177/0022343310378914.

[442] ACLED, *Armed Conflict Location & Event Data Project (ACLED) Codebook* (Armed Conflict Location & Event Data Project, 2019), https://acleddata.com/download/2827/.

[443] Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 110.

[444] Cunningham, Murphy, and Everton, 110,119-123; Stanley Wasserman and Katherine Faust, *Social Network Analysis: Methods and Applications*, vol. 8 (Cambridge university press, 1994), 263–83.

[445] Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 10.

visualizes the dyadic relationships between nodes such as militaries, terrorists, political groups, ethnic groups, tribes, and civilians. The relationships, or arcs, are events between nodes that include armed clashes (pink lines) between two armed groups, attacks (green lines) directed at civilians, and violent demonstrations (blue lines) against government actors. Readers should note the interconnectivity and transregional nature of the violent groups. While many of the violent groups travel between regions, the clustering of violent events concentrates by region.
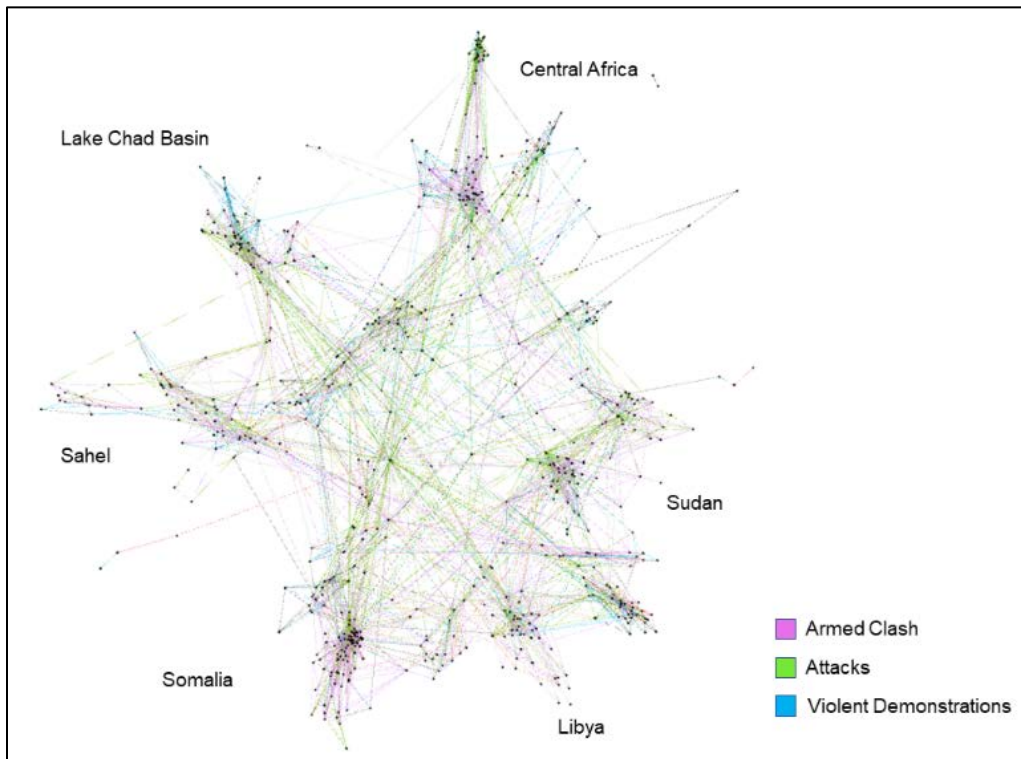

Figure 20 is the product of the ACLED dataset spanning from 2010–2019, showing violence between actors by region using a K-core analysis of 25 ties. The ACLED African Violence Network displays the transregional nature of the network of violence and clustering or dispersion of actors committing violence in the specific regions. Of note, the distinction between Armed Clash (pink) and Attacks (green) is that attacks specifically target unarmed civilians, while armed clashes denote violence between two armed parties.

Figure 20.   ACLED African Violence Network[446]

446 Adapted from ACLED, "ACLED Data"; *Gephi - The Open Graph Viz Platform*, version 0.9.2, Windows, Java (Gephi, 2019), https://gephi.org/; Raleigh et al., "Introducing ACLED."

Observing the nature of the violence in this form displays how concentrated or disbursed the violence is in these regions. For example, the violence in the Lake Chad Basin and Sahel regions are different despite their geographic proximity. Violence in the Lake Chad Basin is much more concentrated than in the Sahel, indicating a more robust pattern of reoccurring violence between the actors, while the violence in the Sahel is between loosely affiliated actors. The green lines denote attacks specifically against civilians, while the pink lines indicate the clashes between two armed parties.[447] ACLED characterizes armed clashes as violence between security forces and VEOs, but armed clashes could represent violence between armed ethnic or political groups as well.[448] A look at East Africa reveals a concentrated pattern of violence between armed actors.

While ACLED provides useful open-source data, its data is incomplete. CA analysts must fuse open-source data with other legitimate data streams from sources within the U.S. government to create a powerful analytic capability. For example, visualizing the ACLED ego network of U.S. Forces in Somalia yields the image of U.S. Forces in Figure 21. Cunningham et al. describe ego networks as a focus on an actor's immediate network of direct ties and the interrelations between those actors.[449] Figure 21 is relevant because it provides a visual representation of the known U.S. military ego network, yet these relationships are incomplete. Supplementing the ACLED dataset with other civil and classified information would provide a more accurate and complete picture. Due to classifications of actors, this visual does not capture U.S. SOF operating by, with, and through their Somalian partners, which constitutes the majority of the U.S. military activity against the violent groups operating in Somalia. In addition to integrating adjacent U.S. forces, information about which categories of civilians Al Shabaab (AS) targets would provide the basis for further investigation and insights into AS's behavior and motivations.

While Figure 21 shows the U.S. Military's ego network in East Africa, Figure 22 displays Al Shabaab's ego network for comparison. Figure 22 displays the intensity of the

---

447 ACLED, *ACLED Codebook*, 8–10.

448 ACLED, 8–10.

449 Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 41.

violence AS is willing to employ to assert governance over areas it formally controlled. Figure 22 shows the diversity AS's violence against other clans, militias, pirates, and the security forces of various countries. It also shows a lack of attacks (green arcs) on civilians, which positions AS as a legitimate governing actor in contrast to the Somali clans, militias, and security forces that attacked civilians in the past.[450] Furthermore, the AS network is resilient and entrenched due to its credible threat of violence and brokerage position between clans, as exhibited in Table 1. Table 1 offers insights into the SNA measures of actors in the U.S. Military's ego network in East Africa. It represents a portion of the AS's ego network listing AS's betweenness measure, which many consider a measure of brokerage, as double the measure of its closest actor, represented as a conglomeration of unidentified armed groups.[451] AS leverages its brokerage position among violent actors in East Africa. In context, smaller clans in Somalia use AS as a hegemon against the influence of larger clans. In essence, Figure 22 and Table 1 fused with the contextual insight that the smaller Somali clans view AS as a legitimate hegemon against their rival clans and essential to their governance interests indicate that a purely kinetic approach is not a viable strategy for defeating AS. It is this type of civil knowledge integration that is needed to make strategic recommendations for policies dedicated to defeating Al Shabaab. For example, a combination of pseudo operations, information operations, and psychological operations would be an effective way to dismantle the AS network.

---

[450] Sunguta West, "Al-Shabaab Plays on Aid Distribution Role to Win Over Desperate Somalis," *Terrorism Monitor* 15, no. 7 (April 7, 2017), https://jamestown.org/program/al-shabaab-plays-aid-distribution-role-win-desperate-somalis/.

[451] Roberto M. Fernandez and Roger V. Gould, "A Dilemma of State Power: Brokerage and Influence in the National Health Policy Domain," *American Journal of Sociology* 99, no. 6 (1994): 1455–91; Roger V. Gould and Roberto M. Fernandez, "Structures of Mediation: A Formal Approach to Brokerage in Transaction Networks," *Sociological Methodology* 19, no. 1 (1989): 89–126; Cunningham, Murphy, and Everton, *Understanding Dark Networks*, 169–73.
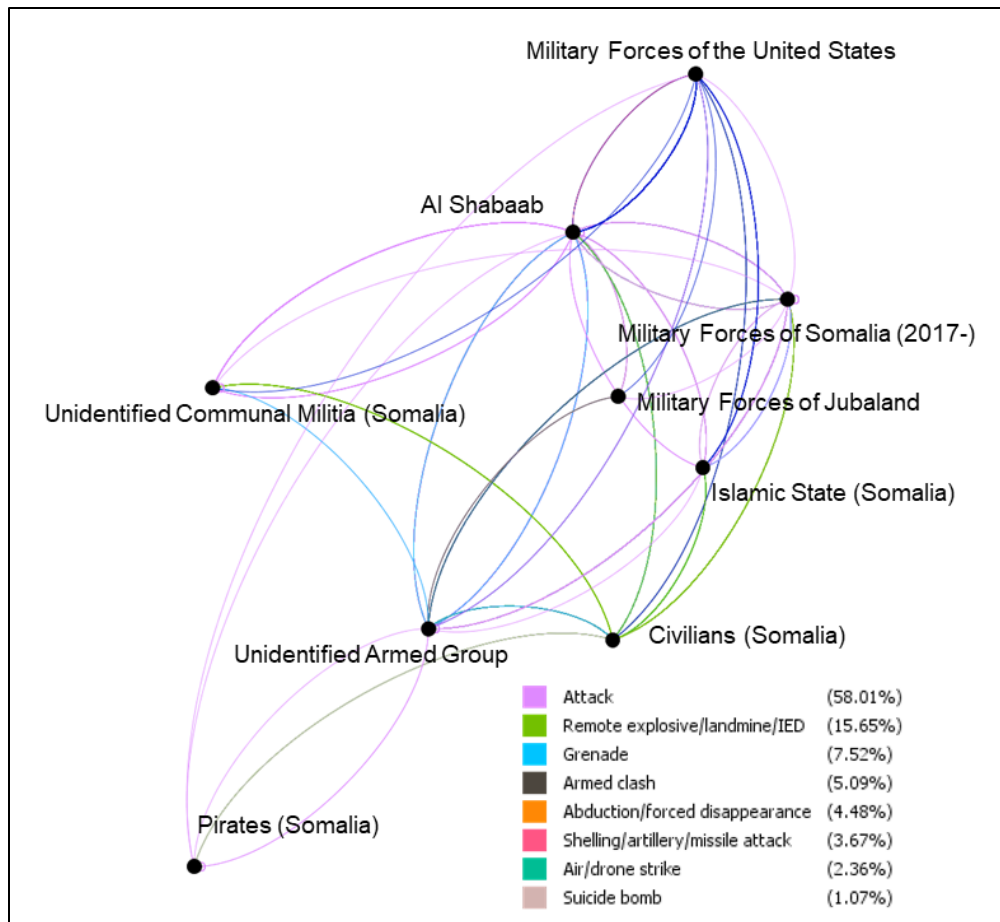
Figure 21 displays the dyadic ego network of U.S. Military Forces in Somalia following a K-core analysis at Core-25. It captures the violent interactions (colored edges) by type between U.S. forces and other actors.

Figure 21.   ACLED U.S. Military Ego Network in East Africa[452]

452 Adapted from ACLED, "ACLED Data"; *Gephi*; Raleigh et al., "Introducing ACLED."
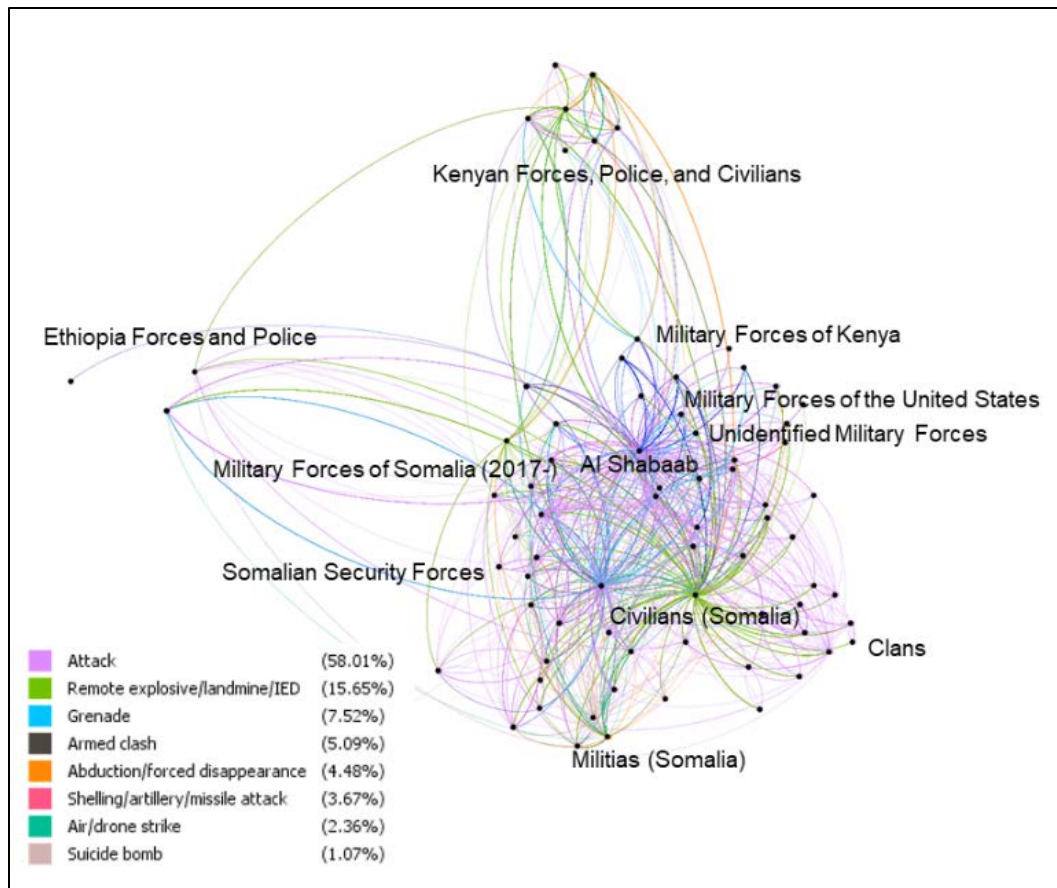
Figure 22 is the visualization of the AS ego-network following a K-core analysis at Core-25. Like Figure 21, it displays relevant actors and describes the remaining clusters with general terms such as militias and clans. Of note, notice the clan and militia violence directed at civilians (green), whereas AS's violence is characterized as armed clashes (pink) with clans, militias, and security forces.

Figure 22.   ACLED Al Shabaab Ego Network in East Africa[453]

453 Adapted from ACLED, "ACLED Data"; *Gephi*; Raleigh et al., "Introducing ACLED."

Table 1.   U.S. Military Ego Network SNA Measures[454]

Id	Indegree	Outdegree	Degree	Closness	Betweeness	Modularity	Eigenvector
Al Shabaab	7049	3802	10851	0.434647	87106.32605	39	0.402155
Unidentified Armed Group (Somalia)	2486	3608	6094	0.408382	36802.47539	0	0.121744
Military Forces of Somalia (2017-)	728	1434	2162	0.341483	5781.45845	39	0.189842
Pirates (Somalia)	26	42	68	0.32607	3037.713934	0	0.000499
Islamic State (Somalia)	83	49	132	0.33254	1042.793466	39	0.00858
Unidentified Communal Militia (Somalia)	42	77	119	0.3426	25.182089	39	0.0028
Military Forces of United States	5	236	241	0.32206	4.380247	39	0.001485
Civilians (Somalia)	6294	0	6294	0	0	0	1
Military Forces of Jubaland (2013-)	26	0	26	0	0	39	0.005565

Table 1 offers insights into the SNA measures of actors in the U.S. Military's Ego Network in East Africa. This table represents a portion of the ACLED East African Violence Network and AS's Ego Network. It is relevant because it lists AS's Betweenness measure, which is widely-considered a measure of brokerage, as double the measure of its closest actor, which is a conglomeration of unidentified armed groups. Thus, AS possesses a high degree of brokerage among violent actors in East Africa.

Lastly, the most useful aspect of ACLED is the inclusion of geospatial data. Figure 23 displays the location and nature of the violence in Somalia. It differentiates between violence committed by AS and other ethnic and political groups. Red dots denote locations of AS violence against civilians and green dots represent the locations of clan and political violence against civilians. These visuals add context and reveal the nature of AS's campaign to re-establish itself as the legitimate governing authority in the Lower Shabelle and Juba regions of Somalia.

---

454 Adapted from ACLED, "ACLED Data"; *Gephi*; Raleigh et al., "Introducing ACLED."
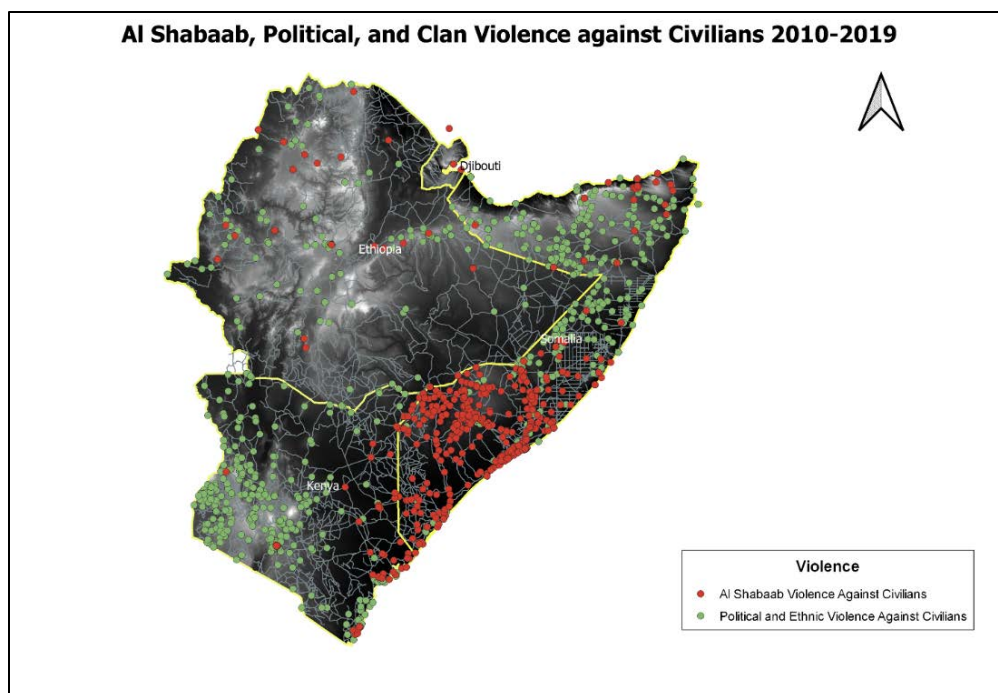
Figure 23.　Al Shabaab, Political, and Clan Violence against Civilians in East Africa (2010–2019) [455]

6.　Evaluate the Efficiency and Effectiveness of the Prescribed Strategies

In keeping with Archie Cochrane's lessons on testing the efficacy of physicians' treatment protocols, CA forces must test the outcomes of its operations and activities.[456] One such way to test the effectiveness of CAA it to overlay open-source data with data regarding the USG's obligation Building Partner Capacity (BPC) Programs in specific countries. For example, Figure 24 displays an example from Northwest Africa that appears to show significantly less violence in countries receiving a majority of the BPC obligations, such as Niger and Mauritania (colored dark blue). This visual prompt the question of why Mali and Burkina Faso received so little funding, as such funding appears to minimize violence across insurgents. The answer lies in the military coup d'états in both countries, in 2013 and 2014 respectively, that prohibits military assistance and aid. The data patterns

---

[455] Adapted from ACLED, "ACLED Data"; *QGIS*, version 3.80, Windows, Python (QGIS, 2019), https://qgis.org/en/site/; Robert Hijmans, "Download Data by Country," GIS Repository, DIVA-GIS, March 10, 2019, https://www.diva-gis.org/gdata; Raleigh et al., "Introducing ACLED."

[456] Tetlock and Gardner, *Superforecasting*, 32.

raise a clear question: should the U.S. reconsider its policy given these circumstances? A regression model with a Poisson distribution could predict the number of attacks per district based on U.S. BPC funds obligated to partner units in the districts. Such methods could provide a rigorous approach to weigh the cost and benefits of pursuing recommended policy changes.
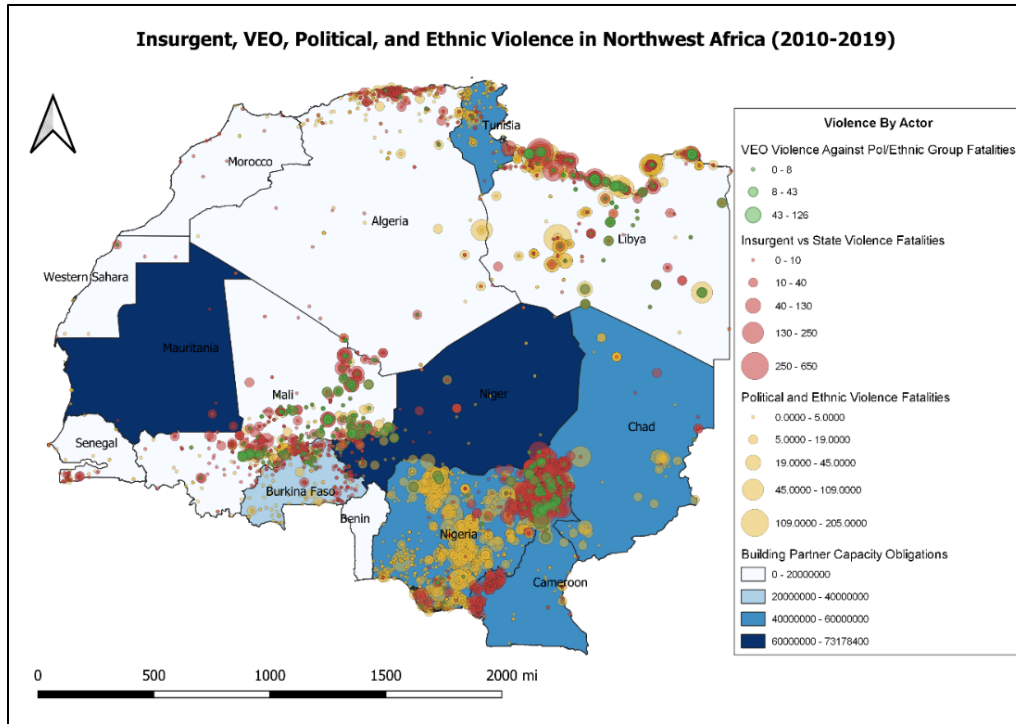

Figure 24.   The Effect of Building Partner Capacity Programs on Insurgent,
VEO, Political, and Ethnic Violence in Northwestern Africa
(2010–2019)[457]

---

[457] Adapted from ACLED, "ACLED Data"; *QGIS*; Hijmans, "Download Data by Country"; United States Agency for International Development Data Services, "USAID Foreign Aid Explorer (FAE)"; Raleigh et al., "Introducing ACLED."

These recommendations highlight some of the analytical techniques that should be employed to build a shared understanding of the operational environment. These examples are by no means a comprehensive account of the methods available for CA analysts. Rather, these recommendations demonstrate the utility of analytical methods CA analysts can use to build a common understanding of the operating environment using data-driven approaches.

B. DEVELOPING AN ORGANIC CIVIL AFFAIRS ANALYTIC CAPABILITY

This research offers several recommendations relevant to the development of a Civil Affairs analytic capability. Many of them contrast with the CA Proponent's vision of CA forces and their future support to MDTFs, U.S. Army, and the Joint Force.

1. Focus on Analysis

Civil Affairs must put analysis at the center of its organizational structure. In *Networks and Netwars*, John Arquilla identifies the prominent role of analysis when he offers the Los Angeles County Operational Area's Terrorism Early Warning Group (TEW) as an alternative hybrid structure to confront irregular threats.[458] Figure 25 displays the TEW organizational structure. While Los Angeles County created the TEW Group to deny irregular threats the ability to exploit the seams between traditional law enforcement and military responses, Arquilla and David Ronfeldt note its relevance for three reasons. First, it focuses on irregular warfare, a problem that by design exploits the seams between criminal, military, and unconventional activities. CA should emulate this structure. Second, it relies on Open-Source Intelligence (OSINT), which this research promotes due to its constant evolution and incorporation of new analytical techniques and large volumes of structured information that analysts can leverage using open-source software to generate conclusions. Lastly, and most importantly, TEW is relevant because it places its strategic analytical capability at the center of the organization, recognizing that the other organizational tasks must flow through this capability.

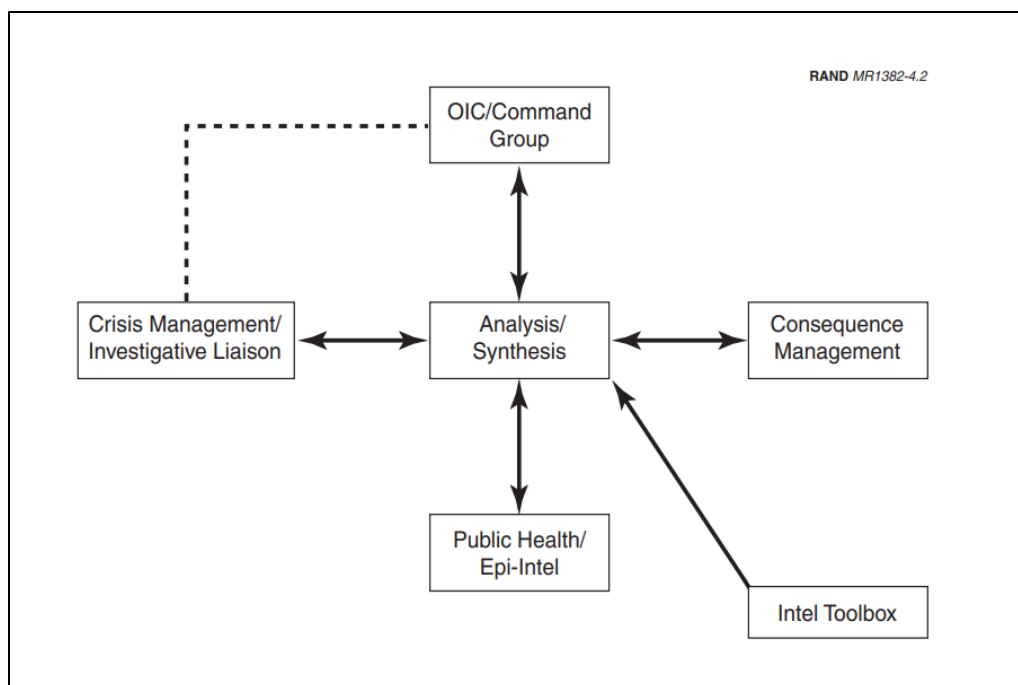[458] Arquilla and Ronfeldt, *Networks and Netwars*, 139–42.

Figure 25.   Terrorism Early Warning Group/Net Assessment Organization[459]

a.   *End the Outsourcing of Analysis*

As noted in earlier sections, Civil Affairs outsources the analysis of its civil data to military intelligence analysts in a process known as Intelligence Preparation of the Battlefield (IPB), or its joint equivalent, JIPOE. While this collaboration serves a vital function in both the U.S. Army and Joint planning processes, CA forces must take ownership of their analysis to ensure effective civil knowledge integration. Critics might argue that this type of analysis is better suited to military intelligence or Operational Research and Systems Analysis (ORSA) personnel; however, the skills they provide are limited by the differences in their operational experiences. CA forces possess unique experiences that other entities within the joint force cannot replicate. Their operational experience and regional context include working with partner nation forces, indigenous partner institutions, interagency, multinational, and unified action partners to achieve U.S. objectives in both Title 10 and Title 22 environments. As Flynn et al. argued, traditional

---

[459] Source: Arquilla and Ronfeldt, 142, Figure 4–2

163

intelligence channels will always prioritize their efforts towards threat actors. If CA forces continue to delegate their analysis to other entities, then there is no guarantee that these analytical functions will fulfill the organizational and institutional priorities necessary for operating beneath the threshold of armed conflict.

b.   Invest in Human Potential

The U.S Army's Capstone and MDO concepts both direct significant investments in human potential to prepare soldiers for operations in future operating environments. Oddly, these investments are absent within the Civil Affairs Proponent's supporting concept outlined in the *Civil Affairs: 2025 and Beyond*. The CA Proponent document outlines its desired analytical techniques without offering pathways for their development. Fortunately, the educational components exist at the Naval Postgraduate School (NPS) in Monterey, CA. The Defense Analysis Program offers courses specifically designed for Special Operations personnel in statistics, strategy, anthropology, research methods, social networks analysis, visual analytics, and open-source data analysis. Civil Affairs Branch should prioritize sending more CA Officers to receive this education and training at NPS for their Intermediate Leaders Education and graduate degrees. Following their graduation, CA Branch should provide these graduates with the option of accepting two-year utilization assignments at a regionally-aligned TSOC or GCC, where the CA Officer would be responsible for civil knowledge integration within the operational staff.

2.   Focus on Civil Knowledge Integration

The placement and design of the Civil Affairs analytical capability are crucial to its performance. The critical requirements necessary for this to operate efficiently and effectively are the following:

1.   Access to information: U.S. operations, NATO operations, partner forces operations, interagency, IGO, NGO, OHDACA, BPC, and partners from across civil society and academia

2.   Efficient and effective integration into planning staffs and targeting working groups at TSOCs or GCCs

164

3.   Ability to travel to locations to obtain further context

4.   Access to a graduate-level research library

In contrast to the Civil Affairs Proponent's answer for joining the ICEWS sections supporting MDTFs, CKI functionality would benefit the most from a strategic analytic capability within the TSOCs and GCCs. While the U.S. Army's MDO concept promotes a calibrated forward force posture, these forces would remain rotational forces. Rotational forces lack the endurance to develop the types of information (e.g., long-term trends) and position (e.g., staff working groups) necessary to inform both operational and strategic approaches of TSOC and GCC staffs where the integration of civil information is decisive for long-term planning.[460] Building these analytical elements into the TSOCs and GCCs would provide CA analysts with assignments lasting between two and three years, which provides sufficient endurance to design and complete projects supporting the employment of these techniques.[461] For example, a two-year assignment allows CA analysts to evaluate multiple rotations of persistent engagement forces and oversee potential responses such as Building Partner Capacity (BPC) programs that develop over a three-year timeline.[462]

---

[460] United States Army Training and Doctrine Command, *The U.S. Army in Multi-Domain Operations 2028*, iii; U.S. Army Special Operations Center of Excellence Civil Affairs Proponent, RE: CIM/HTA Information.

[461] Atkinson, "HRC CA Branch Brief"; Yager, "Setting the Civil Affairs Analytical Foundation," 5.

[462] Defense Security Cooperation Agency, "Section 333 Authority to Build Capacity," Defense Security Cooperation Agency: Security Through Global Partnerships, accessed March 10, 2019, https://www.dsca.mil/programs/section-333-authority-build-capacity.

THIS PAGE INTENTIONALLY LEFT BLANK

VII. CONCLUSION

This research provides a qualitative analysis of the analytic capabilities possessed by the Civil Affairs Branch and argues that an organic, data-driven Civil Affairs analytic capability will improve the performance of the U.S. Forces against irregular threats in future operating environments. It used a critical assessment of CA doctrine and case studies of organizations that leveraged innovative data-driven approaches into disruptive competitive advantages to show the potential benefits of transitioning CA forces towards a data-driven understanding of its operational environment. The critical assessment of CA doctrine found several factors limiting the utility of the civil information currently produced by CA forces. While CA doctrine recommends numerous analytical techniques, it provides no direction or context on how these techniques should be employed. Moreover, CA doctrine also possesses no means of modeling, testing, or critically assessing the veracity of its conclusions about the operational environment.

Despite the focus of this research on CA analytical techniques and their limitations, it also touched on the organizational structures required to meet the challenges of the future operating environment, mechanisms for effective civil knowledge integration, and the impact of SOF CA's preference toward retaining force structure in their tactical formations at the expense of adequately supporting operational and strategic staffs. Designing organizational structures for their expected operating environment is a key component of their success, as each environment carries different requirements for leadership, personnel, resources, and training. Additionally, prioritizing civil knowledge integration at key echelons, primarily the TSOC and GCC staffs, is vital to shaping CA's operational and strategic approaches towards disrupting and defeating irregular threats.

The main finding of this research is that CA forces must change how they interact with data. Many of the components of a data-driven approach already exist within CA doctrine, but they are underemphasized. With modest changes in structure, methodology, and investment in human potential, the Civil Affairs Branch can provide a strategic asset to the Joint Force and greatly improve its performance against irregular threats.

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF REFERENCES

95th Civil Affairs Brigade. "ARSOF CAT Roles and Responsibilities." Presented at 95th Civil Affairs Brigade Mission Essential Task List for Approval, 1st Special Forces Command, Fort Bragg, NC, 03 March 17.

ACLED. *Armed Conflict Location & Event Data Project (ACLED) Codebook*. Armed Conflict Location & Event Data Project, 2019. https://acleddata.com/download/2827/.

Adams, Barbara D., and Robert D.G. Webb. "Trust in Small Military Teams." Humansystems Incorporated. Accessed March 10, 2019. http://www.dodccrp.org/events/7th_ICCRTS/Tracks/pdf/006.PDF.

Anscombe, F.J. "Graphs in Statistical Analysis." *The American Statistician* 27, no. 1 (1973): 17–21. https://doi.org/10.1080/00031305.1973.10478966.

Arquilla, John, and David F. Ronfeldt. *Networks and Netwars the Future of Terror, Crime, and Militancy*. Santa Monica, CA: RAND Corporation, 2001.

Assessing War: The Challenge of Measuring Success and Failure. Washington, DC: Georgetown University Press, 2015.

Atkinson, Mark. "HRC CA Branch Brief." Presented at the Human Resources Command Civil Affairs Branch Brief, Naval Postgraduate School, Monterey, CA, January 22, 2020.

Baer, Robert B. *The Perfect Kill: 21 Laws for Assassination*. New York, NY: Penguin Group, 2014.

Bean, Randy, and Thomas H. Davenport. "Companies Are Failing in Their Efforts to Become Data-Driven." *Harvard Business Review*, February 5, 2019. https://hbr.org/2019/02/companies-are-failing-in-their-efforts-to-become-data-driven.

Blanken, Leo J., and Jason J. Lepore. "Principals, Agents, and Assessment." In *Assessing War: The Challenge of Measuring Success and Failure*. Washington, DC: Georgetown University Press, 2015.

Blanken, Leo, and Justin Overbaugh. "Looking for Intel?... Or Looking for Answers? Reforming Military Intelligence for a Counterinsurgency Environment." *Intelligence and National Security* 27, no. 4 (July 27, 2012): 559–75. https://doi.org/10.1080/02684527.2012.688307.

Borgatti, Stephen P. "Identifying Sets of Key Players in a Social Network."
    Computational & Mathematical Organization Theory 12, no. 1 (April 2006): 21–
    34. https://doi.org/10.1007/s10588-006-7084-x.

Borgatti, Steve, M.G. Everett, and L.C. Freeman. UCINet for Windows: Software for
    Social Network Analysis, version 6.698. Harvard, MA, 2002. Accessed August
    18, 2019. https://sites.google.com/site/ucinetsoftware/downloads

Borgatti, Steve, and Roberta Chase. "About Our Company." Accessed January 19, 2020.
    http://www.analytictech.com/about.htm.

Bowen, Jeremy. "Did Rabin Assassination Kill the Best Chance for Peace?" *BBC News*,
    November 4, 2015, https://www.bbc.com/news/world-middle-east-34712057.

Carley, Kathleen M. ORA-LITE. Pittsburgh, PA, 2019. Accessed August 18, 2019.
    http://www.casos.cs.cmu.edu/projects/ora/software.php.

Carley, Kathleen M., Ju-Sung-Lee, and David Krackhardt. "Destabilizing Networks."
    Connections 24, no. 3 (2002): 79–92.

Chaves, Daniel K., David Christmas, and Tammy L. Sloulin. "Humanitarian Assistance
    Organizations and their Role in Crisis Response on the Korean Peninsula."
    Master's thesis, Naval Postgraduate School, 2018. http://hdl.handle.net/10945/
    61329.

City of Chicago. "Crimes - 2019." Accessed January 20, 2020.
    https://data.cityofchicago.org/Public-Safety/Crimes-2019/w98m-zvie.

Clarke, Richard A, and Randolph P. Eddy. *Warnings: Finding Cassandras to Stop
    Catastrophes*. New York, NY: HarperCollins Publishers, 2017.

Clausewitz, Carl Von. *On War*. Edited by Michael Howard and Peter Paret. Princeton,
    NJ: Princeton University Press, 1989.

Coll, Steve. *Ghost Wars: The Secret History of the CIA, Afghanistan, and Bin Laden,
    from the Soviet Invasion to September 10, 2001*. New York, NY: Penguin Group,
    2004.

"Corruption Perceptions Index 2018." Transparency International, 2019.
    https://www.transparency.org/files/content/pages/2018_CPI_FullResults.zip.

"Country and Territory Ratings and Statuses, 1973–2018." Freedom House, May 8, 2018.
    https://freedomhouse.org/sites/default/files/2020-02/
    2020_Country_and_Territory_Ratings_and_Statuses_FIW1973-2019.xlsx.

Csardi, Gabor, and Tamas Nepusz. "The igraph Software Package for Complex Network
    Research." *InterJournal, Complex Systems* 1695, no. 5 (2006): 1–9.

Cunningham, Daniel. "Day 3 - Data Visualization." Presented at the Visual Analytics, Naval Postgraduate School, Monterey, CA, July 16, 2019.

———. "Lexical Analysis." Presented at the DA3610 Visual Analytics, Naval Postgraduate School, Monterey, CA, August 13, 2019.

———. "Link Analysis vs. Social Network Analysis." Presented at the DA 3610 Visual Analytics, Naval Postgraduate School, Monterey, CA, August 22, 2019.

Cunningham, Daniel, Philip Murphy, and Sean Everton. *Understanding Dark Networks: A Strategic Framework for the Use of Social Network Analysis*. Lanham, MD: Rowman & Littlefield, 2016.

Cunningham, Daniel, Sean Everton, and Philip Murphy. "Collecting, Coding, and Manipulating Social Network Data." In *Understanding Dark Networks: A Strategic Framework for the Use of Social Network Analysis*, 35–84. Lanham, MD: Rowman & Littlefield, 2016.

DataCamp Community. "Choosing Python or R for Data Analysis? An Infographic." January 9, 2020. https://www.datacamp.com/community/tutorials/r-or-python-for-data-analysis.

Davenport, Thomas H., and George Westerman. "Why So Many High-Profile Digital Transformations Fail." *Harvard Business Review*, March 9, 2018. https://hbr.org/2018/03/why-so-many-high-profile-digital-transformations-fail.

Davis, Chase. "Using Big Data to Ask Big Questions." *OpenNews*, October 4, 2013. https://source.opennews.org/articles/using-big-data-ask-big-questions/.

Dayal, Vikram. "Anscombe's Quartet: Graphs Can Reveal." In *An Introduction to R for Quantitative Economics: Graphing, Simulating and Computing*, 59–63. New Delhi: Springer India, 2015. https://doi.org/10.1007/978-81-322-2340-5_9.

Decarlo, Matthew. "Unit of Analysis and Unit of Observation." In *Scientific Inquiry in Social Work*, 182–86. Roanoke, VA: Open Social Work Education, 2018. PDF.

Defense Security Cooperation Agency. "Section 333 Authority to Build Capacity." Accessed December 12, 2019. https://www.dsca.mil/programs/section-333-authority-build-capacity.

Deming, W. Edwards. *The New Economics for Industry, Government, Education*. Second Edition. Cambridge, MA: Massachusetts Institute of Technology Center for Advanced Education Services, 1994.

Department of Peace and Conflict Research. "UCDP - Uppsala Conflict Data Program." Accessed March 21, 2019. https://ucdp.uu.se/.

Department of the Army. *Civil Affairs Civil Information Management*. Army Techniques Publication 3–57.50. Washington, DC: Headquarters, Department of the Army, 2013. https://armypubs.army.mil/ProductMaps/PubForm/Details.aspx?PUB_ID=103622.

———. *Civil Affairs Operations*. Field Manual 3-57. Washington, DC: Headquarters, Department of the Army, 2019. https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/ARN16448_FM%203-57%20FINAL%20WEB.pdf.

———. *Civil Military Engagement*. Army Techniques Publication 3–57.80. Washington, DC: Headquarters, Department of the Army, 2013. https://armypubs.army.mil/ProductMaps/PubForm/Details.aspx?PUB_ID=103796.

———. *Open-Source Intelligence*. Army Techniques Publication 2–22.9. Washington, DC: Headquarters, Department of the Army, 2012. https://fas.org/irp/doddir/army/atp2-22-9.pdf.

Dhar, Vasant. "Data Science and Prediction." *Communications of the ACM* 56, no. 12 (December 2013): 64–73. https://doi.org/10.1145/2500499.

Dunteman, George H. (George Henry), and Moon-Ho R. Ho. "Classical Multiple Regression Model." In *An Introduction to Generalized Linear Models*, 11–18. Quantitative Applications in the Social Sciences 145. Thousand Oaks, Calif: Sage Publications, 2006. https://dx.doi.org/10.4135/9781412983273.

———. "Logistic Regression." In *An Introduction to Generalized Linear Models*, 36–43. Quantitative Applications in the Social Sciences 145. Thousand Oaks, Calif: Sage Publications, 2006. https://dx.doi.org/10.4135/9781412983273.

Edwards, Gemma. *Social Movements and Protest*. New York, NY: Cambridge University Press, 2014.

Everton, Sean, and Daniel Cunningham. "Introduction to R for SNA." Presented at the DA4610 Dynamic Network Analysis, Naval Postgraduate School, Monterey, CA, September 30, 2019.

Everton, Sean F. *Disrupting Dark Networks*. New York, NY: Cambridge University Press, 2012.

Everton, Sean F., and Nancy Roberts. "Strategies for Combating Dark Networks." *Journal of Social Structure* 12 (2011): 1–32. http://hdl.handle.net/10945/41260.

Everton, Sean, and Nancy C. Roberts. "Monitoring and Disrupting Dark Networks A Bias toward the Center and What It Costs Us." *Middle East Review of Public Administration* 2, no. 1 (2016): 1–18. http://hdl.handle.net/10945/48845.

Federal Emergency Management Agency. "FEMA Flood Map Service Center." Federal Emergency Management Agency. Accessed December 1, 2020. https://msc.fema.gov/portal/home.

Fernandez, Roberto M., and Roger V. Gould. "A Dilemma of State Power: Brokerage and Influence in the National Health Policy Domain." *American Journal of Sociology* 99, no. 6 (1994): 1455–91. https://doi.org/10.1086/230451.

Fisher, Rebecca, Rob Johnston, and Peter Clement. "Is Intelligence Analysis a Discipline?" In *Analyzing Intelligence: National Security Practitioners' Perspectives*, edited by James B. Bruce and Roger Z. George, 57–80. Washington, DC: Georgetown University Press, 2014.

Flynn, Michael T., Matt Pottinger, and Paul D. Batchelor. *Fixing Intel: A Blueprint for Making Intelligence Relevant in Afghanistan*. Washington, DC: Center for a New American Security, 2010.

Foote, Colin J. "Digital Repression and Conflict Violence." Master's thesis, Naval Postgraduate School, 2018. http://hdl.handle.net/10945/61367.

Freeman, Linton C., Douglas Roeder, and Robert R. Mulholland. "Centrality in Social Networks: II. Experimental Results." *Social Networks* 2, no. 2 (1979): 119–41. https://doi.org/10.1016/0378-8733(79)90002-9.

Galula, David. *Counterinsurgency Warfare: Theory and Practice*. Westport, CT: Praeger Security International, 2006.

George, Roger Z., and James B. Bruce. "Conclusion: Professionalizing Intelligence Analysis in the Twenty-First Century." In *Analyzing Intelligence: National Security Practitioners' Perspectives*, edited by James B. Bruce and Roger Z. George, 337–53. Washington, DC: Georgetown University Press, 2014.

Gephi. "Learn How to Use Gephi." Accessed February 19, 2020. https://gephi.org/users/.

Gephi Consortium. Gephi – The Open Graph Viz Platform, version 0.9.2. 2019. Accessed August 18, 2019. https://gephi.org/.

Gerasimov, Valery. "The Value of Science Is in the Foresight: New Challenges Demand Rethinking the Forms and Methods of Carrying out Combat Operations." *Military Review* 96, no. 1 (February 2016): 24–29.

Gladwell, Malcolm. *Blink: The Power of Thinking Without Thinking*. First eBook Edition. New York: Hachette Book Group USA, 2007. iBooks.

———. *Outliers: The Story of Success*. First eBook Edition: November 2008. New York, NY: Hachette Book Group, Inc., 2008. iBooks.

Gould, Roger V., and Roberto M. Fernandez. "Structures of Mediation: A Formal Approach to Brokerage in Transaction Networks." *Sociological Methodology* 19, no. 1 (1989): 89–126.

Gourville, John T. "Note on Innovation Diffusion: Rogers' Five Factors." Cambridge, MA: Harvard Business School, April 17, 2006.

Handcock, Mark S., David R. Hunter, Carter T. Butts, Steven Goodreau, and Martina Morris. "Statnet: Software Tools for the Representation, Visualization, Analysis and Simulation of Network Data." *Journal of Statistical Software* 24, no. 1 (July 10, 2008): 1548–7660. https://doi.org/10.18637/jss.v024.i01.

Hayes, Samuel L., Jr., Daniel K. Chaves, and Christopher W. Tunning. "Operationalizing Civil Affairs' Value, CIM: Breaking Partner Silos to Illuminate and Shape Network Warfare." Presented at the Commander's Initiatives Group, Fort Stewart, GA, November 2016.

Hayes, Samuel L., Jr., and Ken Nguyen. "CA 2025: The Strategic Design of Civil Affairs." Capstone, Naval Postgraduate School, 2015. http://hdl.handle.net/10945/45870.

Hegre, Håvard, Joakim Karlsen, Håvard Mokleiv Nygård, Håvard Strand, and Henrik Urdal. "Predicting Armed Conflict, 2010–2050." *International Studies Quarterly* 57, no. 2 (2013): 250–70. https://doi.org/10.1111/isqu.12007.

Hendler, James, and Jennifer Golbeck. "Metcalfe's Law, Web 2.0, and the Semantic Web." Journal of Web Semantics 6, no. 1 (2008): 14–20. https://doi.org/10.1016/j.websem.2007.11.008.

Hernandez, Alejandro S., Julian Ouellet, and Christopher J. Nannini. "Circular Logic and Constant Progress: IW Assessments in Afghanistan." In *Assessing War: The Challenge of Measuring Success and Failure*, edited by Leo J. Blanken, Hy Rothstein, and Jason J. Lapore, 214–31. Washington, DC: Georgetown University Press, 2015.

Hijmans, Robert. "Download Data by Country." DIVA-GIS, Accessed March 10, 2019. https://www.diva-gis.org/gdata.

Hoops, Hatteras A. *Information & Knowledge Management White-Paper: DTRA/JIDO CDI Observations & Recommendations*. Stuttgart, Germany: SOCAFRICA, 2017.

Jagadish, Hosagrahar Visvesva. "Big Data and Science: Myths and Reality." *Big Data Research* 2, no. 2 (2015): 49–52. https://doi.org/10.1016/j.bdr.2015.01.005.

Johnson, Rita. "IWTC Virginia Beach Foreign Military Intelligence Collection Activities Course Earns Joint Certification." *CHIPS*, January 19, 2019. https://www.doncio.navy.mil/CHIPS/ArticleDetails.aspx?ID=9936.

Joint Forces Command. *U.S. Joint Forces Command Millennium Challenge 2002: Experimental Report*. Norfolk, VA: Joint Forces Command, 2002.

Jones, Michael. "Vietnam War (1954-1975): Who Do You Think Is Going to Win? Fight the Narrative!" Presented at the NWC 3230 Strategy and War, Naval Postgraduate School, Monterey, CA, February 22, 2019.

Journal of Data Science. "Journal of Data Science: About JDS." Accessed December 1, 2019. http://www.jds-online.com/about.

Kahneman, Daniel. *Thinking, Fast and Slow*. New York, NY: Farrar, Straus, and Giroux, 2013.

Karlis, Dimitris, and Loukia Meligkotsidou. "Multivariate Poisson Regression with Covariance Structure." *Statistics and Computing* 15, no. 4 (2005): 255–65.

Kelly, Suzanne. "The CIA's Officer of the Future." *The Cipher Brief*, May 28, 2017. https://www.thecipherbrief.com/column_article/best-of-the-cias-officer-of-the-future-2.

Kharkovyna, Oleksii. "A Beginner's Guide to Python for Data Science." *Medium*, July 16, 2019. https://towardsdatascience.com/a-beginners-guide-to-python-for-data-science-60ef022b7b67.

Kofman, Michael, Katya Migacheva, Brian Nichiporuk, Andrew Radin, Olesya Tkacheva, and Jenny Oberholtzer. *Lessons from Russia's Operations in Crimea and Eastern Ukraine*. Santa Monica, CA: RAND Corporation, 2017. https://doi.org/10.7249/RR1498.

Kontos, Michael C., Deborah B. Diercks, and J. Douglas Kirk. "Emergency Department and Office-Based Evaluation of Patients With Chest Pain." *Mayo Clinic Proceedings* 85, no. 3 (March 2010): 284–99. https://doi.org/10.4065/mcp.2009.0560.

Koschade, Stuart. "A Social Network Analysis of Jemaah Islamiyah: The Applications to Counterterrorism and Intelligence." *Studies in Conflict & Terrorism* 29, no. 6 (2006): 559–75. https://doi.org/10.1080/10576100600798418.

Kotter, John P. *Leading Change*. Boston, MA: Harvard Business Review, 1996.

Krackhardt, David, and Jeffrey R. Hanson. "Informal Networks: The Company Behind the Chart." *Harvard Business Review* 71, no. 4 (1993): 104–11.

Krebs, Valdis. "Mapping Networks of Terrorist Cells." *Connections* 24, no. 3 (2002): 43–52.

Krohley, Nicholas. "Integrating Civil Affairs – An Outsider's View." Civil Affairs Association, September 18, 2019. https://www.civilaffairsassoc.org/single-post/2019/09/18/Integrating-Civil-Affairs-%E2%80%93-An-Outsider%E2%80%99s-View.

———. "Moving Beyond the Post-9/11 Manhunt: Translating Tactical Wins into Strategic Success." Modern War Institute, February 6, 2019. https://mwi.usma.edu/moving-beyond-post-9-11-manhunt-translating-tactical-wins-strategic-success/.

Kuah, Weiqi, and Yee Hur William Chew. "Hashtag Warriors: The Influence of Social Media on Collective Violence in Ukraine." Master's thesis, Naval Postgraduate School, 2018. http://hdl.handle.net/10945/61332.

Lee, Doowan. "A Social Movement Approach to Unconventional Warfare." *Special Warfare* 26, no. 3 (2013): 27–33.

Levitt, Steven D. *Freakonomics: A Rogue Economist Explores the Hidden Side of Everything*. Revised and Expanded Edition. New York, NY: William Morrow, 2006.

Lewis, Michael. *Moneyball: The Art of Winning an Unfair Game*. New York, NY: W. W. Norton & Company, 2003. Kindle.

———. *The Undoing Project: A Friendship That Changed Our Minds*. New York, NY: W. W. Norton & Company, 2017.

Liang, Qiao, and Wang Xiangsui. *Unrestricted Warfare*. Beijing: PLA Literature and Arts Publishing House, 1999.

Liddick, Jay, Thurman Scott Dickerson, and Linda K. Chung. "Calibrating Civil Affairs Forces for Lethality in Large Scale Combat Operations." *Small Wars Journal*. Accessed November 4, 2019. https://smallwarsjournal.com/jrnl/art/calibrating-civil-affairs-forces-lethality-large-scale-combat-operations.

Lovett, Andrew, and Robin Flowerdew. "Analysis of Count Data Using Poisson Regression." *The Professional Geographer* 41, no. 2 (1989): 190–98.

Lowenthal, Mark M. "The Education and Training of Intelligence Analysis." In *Analyzing Intelligence: National Security Practitioners' Perspectives*, edited by James B. Bruce and Roger Z. George, 303–18. Washington, DC: Georgetown University Press, 2014.

Lusher, Dean, Johan Koskinen, and Garry Robins, eds. *Exponential Random Graph Models for Social Networks: Theory, Methods, and Applications*. Vol. 35. Structural Analysis in the Social Sciences. New York, NY: Cambridge University Press, 2012.

Lyall, Jason. "Does Indiscriminate Violence Incite Insurgent Attacks?: Evidence from Chechnya." *Journal of Conflict Resolution* 53, no. 3 (2009): 331–62. https://doi.org/10.1177/0022002708330881.

Lyngaas, Sean. "Inside the CIA's New Digital Directorate." *FCW*. October 1, 2015. https://fcw.com/articles/2015/10/01/cia-digital-directorate.aspx.

Manufacturing Intellect. "Michael Lewis interview on 'Moneyball' 2003." February 20, 2017. Video, 14:26. https://www.youtube.com/watch?v=3JBWSFFAb4w.

Marshall, Monty G. "Polity IV Annual Time-Series, 1800–2018." Center for Systemic Peace, July 27, 2019. http://www.systemicpeace.org/inscr/p4v2018.xls.

Mason, Lilliana. *Uncivil Agreement: How Politics Became Our Identity*. Chicago: University of Chicago Press, 2018. Kindle.

Mattis, James N. "USJFCOM Commander's Guidance for Effects-Based Operations." *Parameters* 38, no. 3 (October 1, 2008): 18–25.

McFate, Sean. *The New Rules of War: Victory in the Age of Durable Disorder*. New York, NY: Harper Collins Publishers, 2019. Kindle.

Miller, Bennett, dir. *Moneyball*. 2011; Columbia Pictures Industries, Inc., 2011. https://www.amazon.com.

Milley, Mark A. "Foreword." In *The U.S. Army in Multi-Domain Operations 2028*, i. TRADOC Pamphlet 525–3-1. Fort Eustis, VA: United States Army Training and Doctrine Command, 2018. https://www.tradoc.army.mil/Portals/14/Documents/MDO/TP525-3-1_30Nov2018.pdf.

Mrvar, Andrej, and Vladimir Batagelj. Pajek. Ljubljana, 2003. Accessed October 18, 2019. http://mrvar.fdv.uni-lj.si/pajek/.

———. *Pajek, PajekXXL, Pajek3XL: Programs for Analysis and Visualization of Very Large Networks Reference Manual*. Version 5.8. Ljubljana, 2019. http://mrvar.fdv.uni-lj.si/pajek/pajekman.pdf.

Nagl, John A. "Foreword." In *Counterinsurgency Warfare: Theory and Practice*. Westport, CT: Praeger Security International, 2006.

Nelson, Susan H. "Analytic Outreach: Pathway to Expertise Building and Professionalization." In *Analyzing Intelligence: National Security Practitioners' Perspectives*, edited by James B. Bruce and Roger Z. George, 319–36. Washington, DC: Georgetown University Press, 2014.

Newburn, Tim. *Handbook of Policing*. Cullompton, Devon, UK: Willan Pub, 2012. PDF.

Nooy, Wouter de, Andrej Mrvar, and Vladimir Batagelj. *Exploratory Social Network Analysis with Pajek: Revised and Expanded Edition For Updated Software*. 3rd Edition. Vol. 46. Structural Analysis in the Social Sciences. New York, NY: Cambridge University Press, 2018.

Oliva, Sebastian, "Database of Political Institutions 2015." Inter-American Development Bank, April 17, 2019. https://mydata.iadb.org/Reform-Modernization-of-the-State/Database-of-Political-Institutions-2015/ngy5-9h9d.

Office of the Joint Chiefs of Staff. *Civil-Military Operations*. Joint Publication 3-57. Washington, DC: Office of the Joint Chiefs of Staff, 2018. https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_57.pdf?ver=2018-08-09-144002-597.

———. *Countering Threat Networks*. Joint Publication 3-25. Washington, DC: Office of the Joint Chiefs of Staff, 2016. https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_25.pdf

———. *Joint Concept for Human Aspects of Military Operations (JC-HAMO)*. Washington, DC: Office of the Joint Chiefs of Staff, 2016. https://jdeis.js.mil/jdeis/jel/concepts/human_aspects_military_ops.pdf.

———. *Joint Concept for Operating in the Information Environment (JCOIE)*. Washington, DC: Office of the Joint Chiefs of Staff, 2018. https://jdeis.js.mil/jdeis/jel/concepts/jcoie.pdf.

———. *Joint Operating Concept for Integrated Campaigning*. Washington, DC: Office of the Joint Chiefs of Staff, 2018. https://www.jcs.mil/Portals/36/Documents/Doctrine/concepts/joint_concept_integrated_campaign.pdf?ver=2018-03-28-102833-257.

———. *Joint Operating Environment 2035: The Joint Force in a Contested and Disordered World*. Washington, DC: Office of the Joint Chiefs of Staff, 2016. https://www.jcs.mil/Portals/36/Documents/Doctrine/concepts/joe_2035_july16.pdf?ver=2017-12-28-162059-917.

Ordiway, Benjamin F. "Beyond Tacit Approval: Embracing Special Operations Civil Affairs Support to the Intelligence Information Report." *Small Wars Journal*. Accessed November 18, 2019. https://smallwarsjournal.com/index.php/jrnl/art/beyond-tacit-approval-embracing-special-operations-civil-affairs-support-intelligence.

Pherson, Randolph H., and Richards J. Heuer Jr. "Structured Analytic Techniques: A New Approach to Analysis." In *Analyzing Intelligence: National Security Practitioners' Perspectives*, edited by James B. Bruce and Roger Z. George, 231–48. Washington, DC: Georgetown University Press, 2014.

Protected Information Exchange (PiX). "Requests for Information." Accessed October 31, 2019. https://www.pixtoday.net/rfi/rfi?desc=true&page=0&search=PMESII&sort=createdDateTime.

QGIS, version 3.80. Accessed August 27, 2019. https://qgis.org/en/site/.

Raleigh, Clionadh, Andrew Linke, Håvard Hegre, and Joakim Karlsen. "Introducing ACLED: An Armed Conflict Location and Event Dataset: Special Data Feature." *Journal of Peace Research* 47, no. 5 (September 1, 2010): 651–60. https://doi.org/10.1177/0022343310378914.

Ratcliffe, Jerry. *Intelligence-Led Policing*. Second Edition. London: Routledge, Taylor & Francis Group, 2016. PDF.

Raza, Assad A., and Jerritt A. Lynn. "The Future of Civil Affairs: Creating Regimental Order from Chaos." *Small Wars Journal*. Accessed December 4, 2019. https://smallwarsjournal.com/jrnl/art/future-civil-affairs-creating-regimental-order-chaos.

Red Hat Integration "What Is an API?" Accessed February 2, 2020. https://www.redhat.com/en/topics/api/what-are-application-programming-interfaces.

Ripley, Ruth M., Tom AB Snijders, Zsófia Boda, András Vörös, and Paulina Preciado. *Manual for RSIENA*. Oxford: University of Oxford, Department of Statistics, Nuffield College, 2011. http://www.stats.ox.ac.uk/~snijders/siena/RSiena_Manual.pdf.

Rogati, Monica. "The AI Hierarchy of Needs." Hackermoon, June 12, 2017. https://hackernoon.com/the-ai-hierarchy-of-needs-18f111fcc007.

Rossi, Richard J. "Generalized Linear Models." In *Mathematical Statistics*, 331–82. Hoboken, NJ: John Wiley & Sons, Inc., 2018. PDF.

Rothstein, Hy S. "Civil-Military Relations and Assessments." In *Assessing War: The Challenge of Measuring Success and Failure*, edited by Leo J. Blanken and Jason J. Lepore, 16–30. Washington, DC: Georgetown University Press, 2015.

Sabine, P., and Charles Plumpton. *Statistics*. Core Books in Advanced Mathematics. London: Palgrave Macmillan UK, 1985. PDF.

Sageman, Marc. *Misunderstanding Terrorism*. Philadelphia, PA: University of Pennsylvania Press, 2017.

Scartascini, Carlos, Cesi Cruz, and Philip Keefer. "The Database of Political Institutions 2017 (DPI2017)." Inter-American Development Bank, March 16, 2018. https://doi.org/10.18235/0001027.

Shore, Zachary. *A Sense of the Enemy: The High-Stakes History of Reading Your Rival's Mind*. New York, NY: Oxford University Press, 2014.

———. *Blunder: Why Smart People Make Bad Decisions*. New York, NY: Bloomsbury, 2008.

Silver, Nate. *The Signal and the Noise: Why So Many Predictions Fail-but Some Don't*. New York, NY: Penguin Books, 2015.

Sinek, Simon. "The Infinite Game." May 31, 2018. Video, 25:48. https://www.youtube.com/watch?v=tye525dkfi8.

Singer, P.W., and Emerson T. Brooking. *LikeWar: The Weaponization of Social Media*. Boston, MA: Houghton Mifflin Harcourt, 2018. Kindle.

Snijders, Tom A.B., Gerhard G. van de Bunt, and Christian E.G. Steglich. "Introduction to Stochastic Actor-Based Models for Network Dynamics." *Social Networks* 32, no. 1 (2010): 44–60. https://doi.org/10.1016/j.socnet.2009.02.004.

Sopko, John F. "Afghanistan Reconstruction: Lessons from the Long War." *PRISM* 8, no. 2 (2019): 26–40.

Sunstein, Cass R. "The Law of Group Polarization." *Journal of Political Philosophy* 10, no. 2 (2002): 175–95. https://doi.org/10.1111/1467-9760.00148.

Tech, Joma. "What REALLY Is Data Science? Told by a Data Scientist." YouTube, June 22, 2018. https://www.youtube.com/watch?v=xC-c7E5PK0Y&t=12s.

TED. "Anne Milgram: Why Smart Statistics Are the Key to Fighting Crime." January 28, 2014. Video, 12:41. https://www.youtube.com/watch?v=ZJNESMhIxQ0.

Tetlock, Philip E., and Dan Gardner. *Superforecasting: The Art and Science of Prediction*. New York, NY: Crown Publishers, 2015. Kindle.

The Comprehensive R Archive Network. "Contributed Packages." Last modified 2019. https://cran.r-project.org/.

———. "Download and Install R." The Comprehensive R Archive Network (CRAN), 2019. https://cran.r-project.org/.

The World Bank. "World Bank Open Data." Last modified 2019. https://data.worldbank.org/.

———. "World Development Indicators." The World Bank, 2019. http://databank.worldbank.org/data/download/WDI_csv.zip.

Townsend, Stephen J. "Preface." In *The U.S. Army in Multi-Domain Operations 2028*, iii–iv. TRADOC Pamphlet 525–3-1. Fort Eustis, VA: United States Army Training and Doctrine Command, 2018. https://www.tradoc.army.mil/Portals/14/Documents/MDO/TP525-3-1_30Nov2018.pdf.

Transparency International. "Corruption Perceptions Index 2018." Accessed June 1, 2019. https://www.transparency.org/cpi2018.

United States Agency for International Development Data Services. "Complete Dataset." United States Agency for International Development (USAID), February 20, 2019. https://explorer.usaid.gov/prepared/us_foreign_aid_complete.csv.

———. "USAID Foreign Aid Explorer (FAE)." Accessed June 1, 2019. https://explorer.usaid.gov/data.

United States Army Civil Affairs and Psychological Operations Command Civil Information Management Cell. "Civil Information Management COP." Presented at the Civil Information Management Common Operating Picture Update, Fort Bragg, NC, July 2015.

United States Army Training and Doctrine Command. *The Army Operating Concept 2014: Win in a Complex World*. TRADOC Pamphlet 525–3-1. Fort Eustis, VA: Department of the Army, 2014. https://usacac.army.mil/sites/default/files/publications/Army%20Operating%20Concept%202014%20%28TP525-3-1%29.pdf.

———. *The U.S. Army in Multi-Domain Operations 2028*. TRADOC Pamphlet 525–3-1. Fort Eustis, VA: United States Army Training and Doctrine Command, 2018. https://www.tradoc.army.mil/Portals/14/Documents/MDO/TP525-3-1_30Nov2018.pdf.

United States Special Operations Command. *Joint Civil Information Management User's Manual*. Version 2.0. Tampa, FL: Headquarters, United States Special Operations Command, 2011. https://publicintelligence.net/ussocom-cim-handbook/.

U.S. Army Special Operations Center of Excellence Civil Affairs Proponent. *Civil Affairs: 2025 and Beyond*. Fort Bragg, NC: U.S. Army Special Operations Center of Excellence, 2018.

———. "Civil Affairs Force Modernization Assessment." Presented at the Civil Affairs Modernization Assessment, Fort Bragg, NC, October 21, 2019.

———. "Civil Affairs Functional Needs Assessment." Presented at the Civil Affairs Modernization Assessment, Fort Bragg, NC, October 21, 2019.

———. RE: CIM/HTA Information. Personal communication, December 11, 2019.

Vacha, Donald. "Civil Affairs 2.0: Breaking the Circular Logic." *Small Wars Journal*. Accessed December 9, 2019. https://smallwarsjournal.com/jrnl/art/civil-affairs-20-breaking-circular-logic.

Valdis Krebs. "Mapping Networks of Terrorist Cells." *Connections*, no. 24 (2002): 43–52.

Van der Aalst, Wil. *Process Mining: Data Science in Action*. 2nd ed. Berlin, Heidelberg: Springer-Verlag Berlin Heidelberg, 2016. https://doi-org.libproxy.nps.edu/10.1007/978-3-662-49851-4.

Vogt, PJ. "The Crime Machine, Part I." Produced by Gimlet Media. In *Replay All*. October 12, 2018. Podcast, MP3 audio, 42:43. https://gimletmedia.com/shows/reply-all/o2hx34.

———. "The Crime Machine, Part II." Produced by Gimlet Media. In *Replay All*. October 12, 2018. Podcast, MP3 audio, 37:20. https://gimletmedia.com/shows/reply-all/n8hwl7/128-the-crime-machine-part-ii#episode-player.

Wall, Andru E. "Demystifying the Title 10-Title 50 Debate: Distinguishing Military Operations, Intelligence Activities & Covert Action." *Harvard National Security Journal* 3, no. 1 (2011): 85.

Wasserman, Stanley, and Katherine Faust. *Social Network Analysis: Methods and Applications*. Vol. 8. Cambridge University Press, 1994.

Warren, T. Camber. "Explosive Connections? Mass Media, Social Media, and the Geography of Collective Violence in African States." *Journal of Peace Research* 52, no. 3 (2015): 297–311. https://doi.org/10.1177/0022343314558102.

———. "Not by the Sword Alone: Soft Power, Mass Media, and the Production of State Sovereignty" 68, no. 1 (2014): 111–41. https://doi.org/10.1017/S0020818313000350.

West, Sunguta. "Al-Shabaab Plays on Aid Distribution Role to Win Over Desperate Somalis." Terrorism Monitor 15, no. 7 (April 7, 2017). https://jamestown.org/program/al-shabaab-plays-aid-distribution-role-win-desperate-somalis/.

Wickham, Hadley, and Garrett Grolemund. *R for Data Science: Import, Tidy, Transform, Visualize, and Model Data*. Second Release. Sebastopol, CA: O'Reilly Media Inc., 2016.

Wu, Jun. "Python vs. R — Choosing the Best Programming Language for Data Science." *Medium*, June 25, 2019. https://towardsdatascience.com/python-vs-r-choosing-the-best-programming-languages-for-data-science-b1327f01f6bf.

Yager, Eric. "Setting the Civil Affairs Analytical Foundation." LinkedIn, May 11, 2018. https://www.linkedin.com/pulse/setting-civil-affairs-analytical-foundation-eric-yager-pmp/.

Yeager, Kristin. "LibGuides: SPSS Tutorials: Creating a Codebook," Kent State University. February 10, 2020. https://libguides.library.kent.edu/SPSS/ Codebooks.

THIS PAGE INTENTIONALLY LEFT BLANK

INITIAL DISTRIBUTION LIST

1.   Defense Technical Information Center
        Ft. Belvoir, Virginia

2.   Dudley Knox Library
        Naval Postgraduate School
        Monterey, California